

# PATENT ABSTRACTS OF JAPAN

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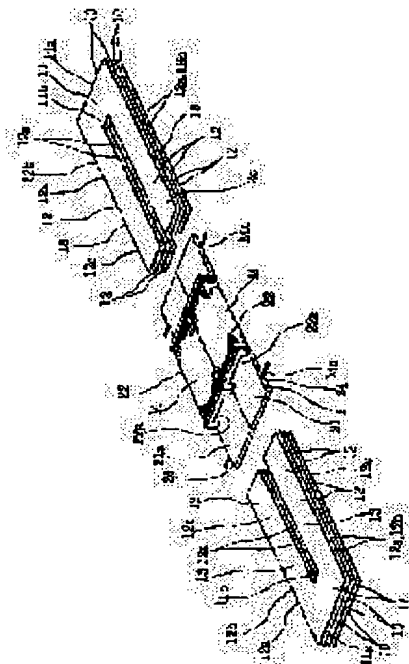
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(54) COIL

(57)Abstract:

PROBLEM TO BE SOLVED: To make a coil thin without hindrance.

SOLUTION: A coil includes a magnetic core body 1, made up of laminated magnetic thin plates 10, in which a pair of leg plate parts 12 are extended fully in the same direction from both edges of a base part 11, a reinforcement plate part 21 formed along one face side of the magnetic core 1, a cover part 22b stored in a flat tube-shaped winding part 22, and a bobbin 2 made of insulating material. In this case, the flat tube-shaped winding part 22 is constituted of the reinforcement plate part 21, and at least part of each leg plate part 13 of the magnetic core body 1 with the reinforcement plate part 21 formed along one face side thereof.



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## CLAIMS

[Claim(s)]

[Claim 1] The coil characterized by having the bobbin which is equipped with the following and consists of insulating material, and being constituted. The core object constituted by carrying out the laminating of the sheet metal-like magnetism board made to install so that the tripod plate section of a couple may be projected from the ends side of the substrate section to the same direction at one. The back-up-plate section prepared in the whole surface side of this core object by accompanying. The covering section which constitutes a flat tubed coil part by the back-up-plate section concerned, and stores a part of tripod plate section portion [ at least ] of the couple in the aforementioned core object which mated the whole surface side with this back-up-plate section in the coil part concerned, respectively.

[Claim 2] The coil according to claim 1 characterized by giving the secondary coil to the part where the coil of the aforementioned upstream in the two coil parts concerned is not given, respectively while the coil of an upstream is given to each of two coil parts of a bobbin.

[Claim 3] The coil according to claim 1 characterized by giving the coil secondary in the coil of an upstream to one side of two coil parts of a bobbin on another side of the two coil parts concerned.

[Claim 4] While a bobbin joins the bobbin object of the couple equipped with the back-up-plate section and the coil part and constituting it. The crevice and projected part which \*\* each other mutually are prepared in the joint of one bobbin object, and the joint of the bobbin object of another side. The claim 1 characterized by constituting so that the rear field where a core object is decorated with the back-up-plate section of one bobbin object and the back-up-plate section of the bobbin object of another side in the junction state which stored the projected part in this crevice may be positioned on the same flat surface, a coil according to claim 2 or 3.

[Claim 5] While a bobbin joins the bobbin object of the couple equipped with the back-up-plate section and the coil part and constituting it. It has the insulating secondary-forming layer which consists of plastic material formed so that the medial surface and this field of the coil part concerned might be made in the gradation section which the back-up-plate section in the bobbin object of this couple was able to lower to the medial surface of the coil part concerned formed in the outside of a coil part, respectively, the secondary-forming layer concerned. The claim 1 characterized by having formed so that it may continue between the aforementioned gradation sections of the bobbin object of the couple concerned where the bobbin object of the couple which gave the coil to the aforementioned coil part is joined, a coil according to claim 2 or 3.

[Claim 6] The coil according to claim 4 or 5 with which the insulating side plate section is characterized by having protruded so that the end face of the core object attached decoratively along the joint in the back-up-plate section concerned and the marginal part in an opposite side may be worn, while providing the terminal so that it may project to the method of outside from the end face of the joint in the bobbin object of a couple, and the back-up-plate section in an opposite side.

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to improvement of a coil which has the core object constituted by carrying out the laminating of the tabular magnetism board.

[0002]

[Description of the Prior Art] In various kinds of electronic equipment, although the coil which has the core object constituted by carrying out the laminating of the magnetic board is used for various uses, also making this coil into a thin shape as much as possible has been called for from the request of thin-shape, the miniaturization of electronic equipment in recent years, lightweight-izing, and J-izing. Especially, in the coil used for electronic equipment by which carrying is planned, such as an inverter transformer of the back light of a cellular phone, a line transformer of a modem card, and a line transformer of the modem with a built-in personal computer of a note type, such thin shape-ization is called for strongly.

[0003]

[Problem(s) to be Solved by the Invention] In order to constitute such a coil as thinly as possible, it becomes one policy to make small the thickness (thickness of sense which intersects perpendicularly to winding axis of coil given to outside of this core object through coil bobbin) size of the aforementioned core object, and it is thought effective to make as thin as possible each magnetic board by which a laminating is carried out to this so that this core object may be constituted.

[0004] However, if each magnetic board which constitutes the aforementioned core object simply is made thin, the more it will make this magnetic board thin, the more it becomes easy to transform the magnetic board concerned by the external force added in wearing in the coil bobbin of the core object concerned, inclusion in the constituted circuit of a coil, etc. When deformation of such a magnetic board arises, it becomes impossible and to maintain the electrical property of a coil at an expected value.

[0005] Moreover, although the thing whose winding axis of the aforementioned coil of this kind of coil intersects perpendicularly in the thickness direction of electronic equipment and for which the coil concerned is constituted becomes one policy which \*\* to thin shape-ization of this electronic equipment so that it may be suitable, namely, it may become sideways, and the coil concerned can be built into the circuit of the electronic equipment concerned As long as it simplifies the coil part of a coil and the coil of an upstream and a secondary coil are given to this single coil part in piles, this coil part does not obtain an oak colander comparatively thickly with this coil, but it can be said by such technique that sufficient thin shape-ization of a coil cannot be attained.

[0006] Then, even if this invention makes thin the magnetic board which constitutes the core object of this kind of coil, it aims at offer of the coil which could be made to make as thin as possible thickness of the sense which it has the structure where exceptional trouble is not produced, and increase of the thickness of the coil by the coil can be made as small as possible, therefore intersects perpendicularly to the winding axis of the coil in a coil.

[0007]

[Means for Solving the Problem] If it is in invention according to claim 1 in order to attain the aforementioned purpose The core object constituted by carrying out the laminating of the sheet metal-like magnetism board made to install so that may be projected a coil from the ends side of the substrate section to the same direction and the tripod plate section of a couple may be projected to one. The back-up-plate section prepared in the whole surface side of this core object by accompanying, and a part of tripod plate section portion [at least] of the couple in the aforementioned core object which mated the whole surface side with this back-up-plate section, respectively It considered as the thing of composition of having the bobbin which is equipped with the covering section which constitutes a flat tubed coil part by the back-up-plate section concerned, and is stored in the coil part concerned, and consists of insulating material.

[0008] According to this composition, it can be hard to produce the deformation of a sheet metal-like magnetism board by which a laminating is carried out as possible, and it can be hard to produce change of the electrical property of the coil accompanying deformation of this magnetic substance, and degradation by the back-up-plate section of the aforementioned bobbin. Therefore, the laminating number of sheets of the sheet metal-like magnetism board which can constitute this magnetic substance as thinly as possible, and constitutes the magnetic substance can be decreased convenient, consequently the thickness size of the coil in the direction of a laminating of this sheet metal-like magnetism board is restricted as much as possible, and it can do small.

[0009] Moreover, if it was in invention according to claim 2, while the coil of an upstream was given to each of two coil parts of the bobbin in a coil according to claim 1, it considered as the composition in which the secondary coil is given to the part where the coil of the aforementioned upstream in the two coil parts concerned is not given, respectively.

[0010] According to this composition, flat tubed is prepared in the aforementioned coil part by the parallel state nothing and separately, and moreover, since the coil of an upstream and a secondary coil are not wound around one coil part in piles, the thickness size after the coil in short \*\*\*\*\* of a laminating of the aforementioned coil part, i.e., the direction of the aforementioned sheet metal-like magnetism board, can be made still smaller.

[0011] Moreover, if it was in invention according to claim 3, it considered as the composition with which the coil secondary to another side of the two coil parts concerned in the coil of an upstream is given at two coil parts of the bobbin in a coil according to claim 1.

[0012] According to this composition, the coil part of the coil of an upstream and the coil part of a secondary coil flat tubed Nothing. And separately, it is prepared in the parallel state, and moreover, since the coil of an upstream and a secondary coil are not wound around one coil part in piles, the thickness size after the coil in short \*\*\*\*\* of a laminating of the aforementioned coil part, i.e., the direction of the aforementioned sheet metal-like magnetism board, can be made still smaller.

[0013] Moreover, if it is in invention according to claim 4, while the bobbin which constitutes a claim 1 and a coil according to claim 2 or 3 joins the bobbin object of the couple equipped with the back-up-plate section and the coil part further and constituting it. The device and projected part which \*\* each other mutually are prepared in the joint of one bobbin object, and the joint of the bobbin object of another side. It shall constitute so that the near field where a core object is decorated with the back-up-plate section of one bobbin object and the back-up-plate section of the bobbin object of another side in the junction state which stored the projected part in this device may be positioned on the same flat surface.

[0014] By giving a coil to the coil part of each bobbin object, and making the aforementioned junction after this, before joining the bobbin object of a couple according to this composition As a level difference is not produced in the field of the side with which the core object in the aforementioned back-up-plate section of each bobbin object is decorated, the back-up-plate section of a bobbin can be made to form in it, and it can avoid producing trouble in support of the core object by the back-up-plate section, making easy to perform the work which gives a coil to a coil part.

[0015] Moreover, if it is in invention according to claim 5, while the bobbin which constitutes a

claim 1 and a coil according to claim 2 or 3 joins the bobbin object of the couple equipped with the back-up-plate section and the coil part further and constituting it. It has the insulating secondary-forming layer which consists of plastic material formed so that the medial surface and this field of the coil part concerned might be made in the gradation section which the back-up-plate section in the bobbin object of this couple was able to lower to the medial surface of the coil part concerned formed in the outside of a coil part, respectively, the secondary-forming layer concerned. Where the bobbin object of the couple which gave the coil to the aforementioned coil part is joined, it shall have formed so that it may continue between the aforementioned gradation sections of the bobbin object of the couple concerned.

[0016] Before joining the bobbin object of a couple according to this composition, after this the aforementioned junction by giving a coil to the coil part of each bobbin object by making the gradation section of nothing and the bobbin object of a couple equipped with the aforementioned secondary-forming layer. As a level difference is not produced in the field of the side with which the core object in the aforementioned back-up-plate section of each bobbin object is decorated, the back-up-plate section of a bobbin can be made to form in it, and it can avoid producing trouble in support of the core object by the back-up-plate section, making easy to perform the work which gives a coil to a coil part.

[0017] Moreover, if it was in invention according to claim 6, the insulating side plate section should be equipped with the composition on which it has protruded so that the end face of the core object with which a coil according to claim 4 or 5 is attached decoratively along the joint in the back-up-plate section concerned and the marginal part in an opposite side while providing the terminal so that it may project to the method of outside from the end face of a joint [ in / the bobbin object of a couple / further ] and the back-up-plate section in an opposite side might be worn.

[0018] According to this composition, the bobbin constituted with the bobbin object of a couple joined as mentioned above can be made to be equipped with the aforementioned insulating side plate section which secures the insulation between the core objects with which the terminal and this bobbin are equipped where the width-of-face size of the bobbin concerned and a thickness size are made as small as possible.

[0019]

[Embodiments of the Invention] Hereafter, the gestalt of typical implementation of this invention is explained.

[0020] (Gestalt of the first operation) The gestalt of operation shown in drawing 1 or drawing 18 is explained first. In addition, drawing 1 or drawing 10 shows the bobbin object 24 which constitutes the bobbin 2 of a coil here, respectively. Drawing 1 looks at one of the bobbin objects 24 concerned from the whole surface side of the back-up-plate section 21, and drawing 2 is regarded as drawing 1 from an opposite side, and from the left-hand side in drawing 1, from right-hand side [ in / drawing 1 / in drawing 4 ], drawing 3 looks at a top / in / drawing 1 / in drawing 5 ] to the bobbin object 24 concerned, and shows it, respectively. Moreover, drawing 6 makes the bobbin object 24 a cross section along the length direction, and drawing 7 and drawing 8 make the bobbin object 24 concerned a cross section along the cross direction, and show it, respectively. Moreover, drawing 9 and drawing 10 show the bobbin object 24 in the state of the tropia, respectively.

[0021] Coil M is given to drawing 11 at the coil part 22, respectively, and the bobbin objects 24 and 24 of a couple just before opposing the joint 24c side and being joined are shown, moreover, moreover, drawing 12 The bobbin objects 24 and 24 of the couple which was joined with joint 24c and constituted the bobbin 2, and two or more sheet metal-like magnetism boards 10 and 10 — into which the tripod plate section 12 is inserted by the coil part 22 in this bobbin 2 are shown in the state of \*\*\*\*.

[0022] Moreover, as for drawing 13, drawing 14 looks at this coil from the whole surface side of the back-up-plate section 21 as a state of the tropia, drawing 15 is seen from a drawing 14 and opposite side, drawing 16 is in the state seen from the left-hand side in drawing 14, and drawing 13 or drawing 18 shows a coil, respectively, and they show [ drawing 17 and drawing 18 make a coil a cross section along the cross direction, and ] it, respectively.

[0023] The coil concerning the gestalt of this operation has the core object 1 and a bobbin 2. [0024] The core object 1 carries out the laminating of the sheet metal-like magnetism board 10 made to install so that the tripod plate section 12 may be projected to the ends side of the substrate section 11 at one at the same direction, respectively, and is constituted. That is, it is in the gestalt of this operation, in plane view, the laminating of the sheet metal-like magnetism board 10 which allotted the shape of a KO character to this field so that nothing, and the aforementioned substrate section 11 and the tripod plate section 12 might be located on the same flat surface is carried out, and the aforementioned core object 1 is constituted. Each constitutes each sheet metal-like magnetism board 10 \*\*\*\*\* and in the shape of isomorphism. Moreover, the linear dimension of the tripod plate sections 12 and 12 of a couple is constituted so that it may become equal mutually.

[0025] Generally, from side edge 12a which each sheet metal-like magnetism board 10 by which a laminating is carried out makes side edge 12a which exists in the direction of ejection of the tripod plate section 12 concerned meet side edge 12a which exists in the direction of ejection of other sheet metal-like magnetism boards 10 in the tripod plate section 12, and has it in the direction of ejection of other sheet metal-like magnetism boards 10, the laminating of each of this sheet metal-like magnetism board 10 is made in the side, as it does not shift and take out. Although such a laminating can be made even if it lays the substrate section 11 of each sheet metal-like magnetism board 10 on top of the same side if it is in the gestalt of this operation, a laminating is carried out and while adjoins each other, and so that the substrate section 11 of the sheet metal-like magnetism board 10 and the substrate section 11 of the sheet metal-like magnetism board 10 of another side may be located on the contrary. As the substrate section 11 of one sheet metal-like magnetism board 10 puts on ejection one end of the tripod plate section 12 of the sheet metal-like magnetism board 10 of another side, it is making the aforementioned laminating. Consequently, if it is in the gestalt of this operation, the aforementioned core object 1 is presenting the appearance of the shape of an rectangular pipe of short \*\* which makes the letter of the circumference.

[0026] On the other hand, the aforementioned bobbin 2 is accompanied and formed in whole surface side 10a of the aforementioned core object 1 in the first place, and has the back-up-plate section 21 which made the flat side upper surface 21a attached decoratively by this whole surface side 10a. This back-up-plate section 21 has the width of face more than the length more than the length from side edge 11a opposite to the installation side of the tripod plate section 12 in the substrate section 11 of the aforementioned sheet metal-like magnetism board 10 to the ejection edge 12c edge of the tripod plate section 12 concerned, and the size between radial-border 12b which met in the direction of ejection of the tripod plate sections 12 and 12 of the couple of the sheet metal-like magnetism board 10 concerned.

[0027] Moreover, this bobbin 2 constitutes this coil part 22 in flat tubed [ of ends opening 22a ] while having two coil parts 22 in the parallel state the second, and one tripod plate section portion 13 of the core object 1 constituted as mentioned above by one side of this two coil part 22 — moreover, it has considered as the composition which stores the tripod plate section portion 13 of another side of the core object 1 concerning another side of these two coil parts 22 in an insertion state, respectively.

[0028] The coil part 22 which more specifically makes the aforementioned flat tubed one in this bobbin 2 Upper surface 21a with which whole surface side 10a of the aforementioned core object 1 in the aforementioned back-up-plate section 21 is decorated is faced. And it is constituted between covering section 22b which consists of broad Itabe 22c formed so that it might have the inside which makes this upper surface 21a and abbreviation parallel, and narrow Itabe 22d and 22d of a couple, and the aforementioned back-up-plate section 21, the size between upper surface 21a of the back-up-plate section 21, and the inside of broad Itabe 22c in covering section 22b — the thickness size of the aforementioned core object 1 — abbreviation — the size between narrow Itabe [ of a couple / in / covering section 22b / it is equal and ] / 22d and 22d / insides — the width-of-face size of the tripod plate section portion 13 of this core object 1 — abbreviation — it constitutes so that it may become equal

[0029] While can be set to the coil part 22 which makes flat tubed [ which is applied ], another

side from opening 22a moreover, the length to opening 22a In the state where the tripod plate section 12 of the aforementioned sheet metal-like magnetism board 10 was inserted from one opening 22a of this coil part 22 to the position where side edge 11b by the side of ejection of the tripod plate section 12 in the aforementioned substrate section 11 runs against concerned one opening 22a edge It constitutes so that it may become the length by which the aforementioned tripod plate section 12 is projected by the width-of-face size of the aforementioned substrate section 11 from the opening 22a edge of another side.

[0030] moreover, between two coil parts 22 in the aforementioned bobbin 2 arranged in parallel, and 22 It has considered as the composition which the crevice 23 between width of face where not both wound coil M contacts each other is formed in these two coil parts 22 and 22, and was connected [ parts ] in back-up-plate section 21 portion which the coil part 22 side of one coil part 22 side and another side has in the both sides which sandwiched this coil part 22.

[0031] In the gestalt of this operation, one tripod plate section 12 of the aforementioned sheet metal-like magnetism board 10 to one side of two coil parts 22 and 22 in the aforementioned bobbin 2 arranged in parallel consequently, from one opening 22a side of the coil part 22 concerned The tripod plate section 12 of another side of the aforementioned sheet metal-like magnetism board 10 on another side of two coil parts 22 and 22 in this bobbin 2 arranged in parallel moreover, from one opening 22a side of the coil part 22 concerned In the state where the decoration state was made to support the sheet metal-like magnetism board 10 concerned by the aforementioned back-up-plate section 21 by inserting to the position where the substrate section 11 of this sheet metal-like magnetism board 10 runs against one opening 22a edge of the coil part 22 Putting the tripod plate sections 12 and 12 of the couple of the sheet metal-like magnetism board 10 concerned can be kept inside the aforementioned coil part 22, respectively. Moreover, the sheet metal-like magnetism board 10 which precedes the tripod plate section 12 with the coil part 22 in a bobbin 2, and it kept putting to it in this way is received. Then, by carrying out the laminating of two or more sheet metal-like magnetism boards 10, as it keeps putting to the coil part 22 concerned as mentioned above from opening 22a opposite to opening 22 of the aforementioned coil part 22 into which the tripod plate section 12 of the sheet metal-like magnetism board 10 which precedes the sheet metal-like magnetism board 10 by which a laminating is carried out was inserted Thus, the core object 1 which presents the appearance of the shape of an rectangular pipe of short \*\* which makes the above letter of the circumference with the sheet metal-like magnetism board 10 by which the laminating was carried out can be made to form. And the tripod plate section portions 13 and 13 of the couple in this core object 1 can make the state of having kept putting to the aforementioned coil part 22 there being nothing with backlash respectively. In addition, maintenance of the laminating state of this sheet metal-like magnetism board 10 can be made by using the so-called varnish etc. as the front face of this sheet metal-like magnetism board 10 by which the laminating was carried out with \*\* [0032] And the coil M of an upstream is given to one side of the coil parts 22 and 22 of the couple in this bobbin 2, and the secondary coil M is given to another side of the coil parts 22 and 22 of the couple concerned, and the coil is constituted.

[0033] From having the back-up-plate section 21 to which the aforementioned bobbin 2 accompanies the whole surface side of the core object 1 constituted by carrying out the laminating of the sheet metal-like magnetism board 10, if it is in the gestalt of this operation for example, even when it constitutes the core object 1 by using as the sheet metal-like magnetism board 10 the iron nickel magnetism alloy board which sets thickness to 0.1mm or less it can be hard to produce the deformation of the sheet metal-like magnetism board 10 by which a laminating is carried out as possible, and it can be hard to produce change of the electrical property of the coil accompanying deformation of this core object 1, and degradation. Therefore, the laminating number of sheets of the sheet metal-like magnetism board 10 which can constitute this core object 1 as thinly as possible, and constitutes the core object 1 can be decreased convenient.

[0034] Moreover, the coil part 22 of the coil M of an upstream and the coil part 22 of the secondary coil M are separately formed in the parallel state, and since the coil M of an upstream and the secondary coil M are not wound around one coil part 22 in piles, the thickness size after

the coil in the coil part 22 is also as small as possible, and it can do.

[0035] Therefore, according to the coil concerning the gestalt of this operation, the whole coil can be constituted as much as possible in a thin shape. More specifically, the thickness of the coil turned to the superficies side of broad Itabe 22c in the coil part 22 from the inferior-surface-of-tongue 21b side (the upper surface 21a side prepared in whole surface side 10a of the core object 1 by accompanying, opposite side) of the back-up-plate section 21 in the aforementioned bobbin 2 can be constituted so that it may become as thin as possible.

Consequently, the coil concerning the gestalt of this operation is suitable for using for the electronic equipment of a portable thin shape, and enables it to constitute this kind of electronic equipment in a thin shape more.

[0036] According to the coil concerning the gestalt of this operation, the coil part 22 of an upstream and the secondary coil part 22 moreover, separately Since it is prepared in the parallel state, Coil M can be given so that the number of turns and length of the coil M of an upstream and the secondary coil M may be made uniform, and a coil can be constituted so that a difference may not arise in the electrical property resulting from the direct current resistance of the coil M of an upstream, and the secondary coil M etc. Directivity is lost to installation of the coil to an electrical circuit in such a case, and the effort which pays exceptional consideration in installation of the coil to the circuit concerned can be mitigated.

[0037] Moreover, if it is in the gestalt of this operation, the aforementioned bobbin 2 joins the bobbin objects 24 and 24 of a couple, and is constituted.

[0038] If it is in the gestalt of this operation, the bobbin objects 24 and 24 of this couple are constituted in this \*\* and isomorphism.

[0039] each bobbin object 24 -- each -- the above -- while having the back-up-plate section 21 which makes a long and slender tabular, it has the one aforementioned coil part 22 in the middle of the abbreviation for this back-up-plate section 21 Moreover, in both-sides section 24a which sandwiched the coil part 22 which makes the aforementioned flat tubed one, the aforementioned back-up-plate section 21 is constituted so that the board width may be made large.

[0040] And unilateral end-face 24b by the side of the thickness covering the length direction in one back-up-plate section 21 of the bobbin objects 24 and 24 of the couple constituted in this way, Where unilateral end-face 24b by the side of the thickness covering the length direction in the back-up-plate section 21 of another side of the bobbin objects 24 and 24 of this couple is compared, the bobbin objects 24 and 24 of a couple are joined and the aforementioned bobbin 2 is constituted.

[0041] Moreover, the bobbin objects 24 and 24 of this couple are equipped the one side which sandwiched the aforementioned coil part 22 in unilateral end-face 24b of the back-up-plate section 21 set to joint 24c which makes the aforementioned junction, respectively with 24d of stomata, and the other side is equipped with salient of 24d of stomata concerned which fits in 24e. From the position in the middle of [ length direction ] this bobbin object 24, the 24d of the aforementioned stomata and salient 24e in one bobbin object 24 open an equal interval, and are prepared. And since the bobbin objects 24 and 24 of this couple are making this \*\* and isomorphism as mentioned above, If each joint 24c is opposed so that upper surface 21a of the aforementioned back-up-plate section 21 may become the same direction Make salient 24e of the bobbin object 24 of another side enter into 24d of stomata of one bobbin object 24, and salient 24e of one bobbin object 24 is made to enter into 24d of stomata of the bobbin object 24 of another side, and the bobbin objects 24 and 24 of a couple are joined.

[0042] And if it is in the gestalt of this operation, it constitutes so that the near field where the core object 1 is decorated with the back-up-plate section 21 of one bobbin object 24 and the back-up-plate section 21 of the bobbin object 24 of another side in this junction state, i.e., the upper surface of the back-up-plate section 21, may be positioned on the same flat surface.

[0043] Consequently, by giving Coil M to the coil part 22 of each bobbin object 24, and making the aforementioned junction after this, before joining the bobbin objects 24 and 24 of a couple, if it is in the gestalt of this operation Making easy to perform the work which can be made to form the back-up-plate section 21 of a bobbin 2 as does not produce a level difference in upper

surface 21a of the aforementioned back-up-plate section 21 of each bobbin object 24, and gives coil M to the coil part 22. It can avoid producing trouble in support of the core object 1 by the back-up-plate section 21.

[0044] Moreover, since the aforementioned back-up-plate section 21 is made broad in joint 24c of each bobbin object 24, while is arranged in parallel in the aforementioned junction state, and the crevice 23 which is the grade which the given coil M does not contact for each other can be secured between the coil part 22 of the bobbin object 24, and the coil part 22 of another side. [0045] In addition, if it is in the gestalt of this operation, it has the feature which can constitute this \*\* and the bobbin 2 equipped with two coil parts 22 by the aforementioned junction while constituting isomorphous for the bobbin objects 24 and 24 of a couple, and can constitute this bobbin 2 with one kind of bobbin object 24.

[0046] Moreover, while having formed 24f of \*\*\* in broad Itabe 22c and the narrow Itabe 22d edge which touch the double door mouths 22a and 22a of the coil part 22 which makes flat tubed [ in each bobbin object 24 ] It is constituted so that it may be low in this coil part 22 by the ejection size whose inferior-surface-of-tongue 21b of the back-up-plate section 21 is the 24f of the aforementioned \*\*\* and may become. Have formed 24h of level difference sides which continue in the 24g of the directions of inner of 24f of these \*\*\*, and between the 24g of the directions of inner of two aforementioned \*\*\* 24f and 24f, and the 24h of the aforementioned level difference sides following this Coil M is stored in the bottom of inferior-surface-of-tongue 21b in both-sides section 24a of the back-up-plate section 21 which sandwiched the upper-limit side of 24f of \*\*\*, and the coil part 22, and it enables it to have given the coil M concerned. [0047] Moreover, while making the back-up-plate section 21 embed an end, respectively in the side edge section of the aforementioned joint 24c and the contrary in both-sides section 24a of the back-up-plate section 21 which sandwiched the coil part 22 of each bobbin object 24 and having formed the terminal 25, the guide rail 26 of the depth which stores the lead section Ma which is pulled out from the coil M given to this coil part 22, and is entwined by the terminal 25 is formed.

[0048] The aforementioned bobbin object 24 consists of insulating material. Typically, this bobbin object 24 fabricates plastic material to one, and is constituted. Especially when it constitutes the bobbin object 24 using plastic material, it is desirable to constitute the bobbin object 24 from a viewpoint which makes the coil part 22 concerned agree as much as possible in an expected configuration as does not make the aforementioned coil part 22 which makes flat tubed produce distortion and deformation using a liquid crystal polymer or a diallyl phthalate.

[0049] In addition, while giving each of two coil parts 22 and 22 of the bobbin 2 of the coil concerning the form of the operation explained above the coil M of an upstream (namely, coil Ma), the secondary coil M (namely, coil Mb) may be given to the part where the coil Ma of the aforementioned upstream in the two coil parts 22 and 22 concerned is not given, respectively, and a coil may be constituted. ( Drawing 19 , drawing 20 )

[0050] In this case, the coil Ma of the upstream which the two aforementioned coil parts 22 and 22 are alike, respectively, sets, and is wound by adjoining each other, and the secondary coil Mb does not contact electrically -- as -- the coil part 22 concerned -- a collar -- it is desirable to form the batch flange 27 of a \*\*

[0051] It is made in this case, for the coil Ma of the upstream given next to the coil Ma of the upstream given to one side of two coil parts 22 and 22 on another side of two coil parts 22 and 22 to be located as shown in drawing 19 . And it is made for the secondary coil Mb given next to the secondary coil Mb given to one side of two coil parts 22 and 22 on another side of two coil parts 22 and 22 to be located. Or it is made for the secondary coil Mb given next to the coil Ma of the upstream given to one side of two coil parts 22 and 22 on another side of two coil parts 22 and 22 again as shown in drawing 20 to be located. And it is made for the coil Ma of the upstream given next to the secondary coil Mb given to one side of two coil parts 22 and 22 on another side of two coil parts 22 and 22 to be located.

[0052] When a coil is constituted, thus, for example, the terminal which connected the volume end of the coil Ma of the upstream twisted around one side of two coil parts 22 and 22, The terminal which connected the cut water of the coil Ma of the upstream twisted around another

side of two coil parts 22 and 22. Moreover, the terminal which connected the volume end of the secondary coil Mb twisted around one side of two coil parts 22 and 22. It connects electrically through the pattern made to form in the circuit board in which a coil is installed, respectively, and the terminal which connected the cut water of the secondary coil Mb twisted around another side of two coil parts 22 and 22 can be operated as a coil.

[0053] (Gestalt of the second operation) Subsequently to drawing 21 or drawing 31 , the gestalt of operation shown is explained.

[0054] In addition, drawing 21 or drawing 25 shows the bobbin object 45 which constitutes the bobbin 4 of a coil here, respectively, and drawing 21 is seen from the protrusion side of the terminal 47 of the bobbin object 45 concerned, and drawing 22 is regarded as drawing 21 from an opposite side, and from the right-hand side in drawing 21 , drawing 23 looks at the bottom [ in / drawing 21 / from a top / in / drawing 21 / in drawing 24 ] / in drawing 25 ] to the bobbin object 45 concerned, and shows it, respectively.

[0055] Moreover, drawing 26 and drawing 27 show the bobbin objects 45 and 45 of a couple which Coil M was given, respectively, and the joint 45c side was opposed, and were joined to the coil part 42, respectively. Moreover, the bobbin objects 45 and 45 of the couple which drawing 28 and drawing 29 had joint 45c, and were joined, and the secondary-forming layer 46 was formed in 45f of gradation sections in both-sides section 45a of the coil part 42, and was used as the bobbin 4 are shown, respectively.

[0056] Moreover, the process which drawing 30 inserts two or more sheet metal-like magnetism boards 30 and 30 -- which constitute the core object 3 to the coil part 42 one by one to the bobbin 4 of drawing 28 and drawing 29 , and constitutes the core object 3 is shown. Furthermore, drawing 31 looks at and shows from the side two or more sheet metal-like magnetism boards 30 and the coil in the state where a part of tripod plate section portion 33 of the core object 3 was stored for 30 -- in the coil part 42 in preparation for a laminating state.

[0057] The coil concerning the gestalt of this operation has the core object 3 and a bobbin 4. [0058] The core object 3 carries out the laminating of the sheet metal-like magnetism board 30 made to install so that the tripod plate section 32 may be projected to the ends side of the substrate section 31 at one at the same direction, respectively, and is constituted. That is, if it is in the gestalt of this operation, in plane view, the laminating of the sheet metal-like magnetism board 30 which allotted the shape of a KO character to this field so that nothing, and the aforementioned substrate section 31 and the tripod plate section 32 might be located on the same flat surface is carried out, and the aforementioned core object 3 is constituted. Each of each sheet metal-like magnetism boards 30 and 30 -- is constituted \*\*\*\*\* and in the shape of isomorphism. Moreover, the linear dimension of the tripod plate sections 32 and 32 of a couple is constituted so that it may become equal mutually.

[0059] Generally each sheet metal-like magnetism board 30 and 30 -- by which a laminating is carried out set the laminating of each of this sheet metal-like magnetism board 30 in the tripod plate section 32. It shifts from side edge 32a which makes side edge 32a which exists in the direction of ejection of the tripod plate section 32 concerned meet side edge 32a which exists in the direction of ejection of other sheet metal-like magnetism boards 30, and exists in the direction of ejection of other sheet metal-like magnetism boards 30 to the side, and it is made as it does not take out. Such laminatings are each sheet metal-like magnetism boards 30 and 30. -- Although it can make even if it lays the substrate section 31 on top of the same side if it is in the gestalt of this operation, a laminating is carried out and while adjoins each other, and so that the substrate section 31 of the sheet metal-like magnetism board 30 and the substrate section 31 of the sheet metal-like magnetism board 30 of another side may be located on the contrary As the substrate section 31 of one sheet metal-like magnetism board 30 puts on the ejection edge 32c side of the tripod plate section 32 of the sheet metal-like magnetism board 30 of another side, it is making the aforementioned laminating. Consequently, if it is in the gestalt of this operation, the aforementioned core object 3 is presenting the appearance of the shape of an rectangular pipe of short \*\* which makes the letter of the circumference.

[0060] On the other hand, the aforementioned bobbin 4 is accompanied and formed in whole surface side 30a of the aforementioned core object 3 in the first place, and has the back-up-

plate section 41 which made the flat side upper surface 41a attached decoratively by this whole surface side 30a. This back-up-plate section 41 has the width of face more than the length more than the length from side edge 31a opposite to the installation side of the tripod plate section 32 in the substrate section 31 of the aforementioned sheet metal-like magnetism board 30 to the ejection edge 32c edge of the tripod plate section 32 concerned, and the size between radial-border 32b which met in the direction of ejection of the tripod plate sections 32 and 32 of the couple of the sheet metal-like magnetism board 30 concerned.

[0061] Moreover, this bobbin 4 constitutes this coil part 42 in flat tubed [ of ends opening 42a ] while having two coil parts 42 and 42 in the parallel state the second, and one tripod plate section portion 33 of the core object 3 constituted as mentioned above by one side of these two coil parts 42 and 42 — moreover, it has considered as the composition which stores the tripod plate section portion 33 of another side of the core object 3 concerning another side of these two coil parts 42 and 42 in an insertion state, respectively

[0062] The coil part 42 which more specifically makes the aforementioned flat tubed ones in this bobbin 4 Upper surface 41a with which whole surface side 30a of the aforementioned core object 3 in the aforementioned back-up-plate section 41 is decorated is faced. And it is constituted between covering section 42b which consists of broad Itabe 42c formed so that it might have the inside which makes this upper surface 41a and abbreviation parallel, and narrow Itabe 42d and 42d of a couple, and the aforementioned back-up-plate section 41. the size between upper surface 41a of the back-up-plate section 41, and the inside of broad Itabe 42c in covering section 42b — the thickness size of the aforementioned core object 3 — abbreviation — the size between narrow Itabe [ of a couple / in / covering section 42b / it is equal and ] / 42d and 42d / insides — the width-of-face size of the tripod plate section portion 32 of this core object 3 — abbreviation — it constitutes so that it may become equal

[0063] While can be set to the coil part 42 which makes flat tubed [ which is applied ], another side from opening 42a moreover, the length to opening 42a In the state where the tripod plate section 32 of the aforementioned sheet metal-like magnetism board 30 was inserted from one opening 42a of this coil part 42 to the position where side edge 31b by the side of ejection of the tripod plate section 32 in the aforementioned substrate section 31 runs against concerned one opening 42a edge It constitutes so that it may become the length by which the aforementioned tripod plate section 32 is projected by the width-of-face size of the aforementioned substrate section 31 from the opening 42a edge of another side.

[0064] moreover, between two coil parts 42 in the aforementioned bobbin 4 arranged in parallel, and 42 It has considered as the composition which the crevice 43 between width of face where not both wound coil M contacts each other is formed in these two coil parts 42 and 42, and was connected [ parts ] in back-up-plate section 41 portion which the coil part 42 side of one coil part 42 side and another side has in the both sides which sandwiched this coil part 42.

[0065] In the gestalt of this operation, one tripod plate section 32 of the aforementioned sheet metal-like magnetism board 30 to one side of two coil parts 42 and 42 in the aforementioned bobbin 4 arranged in parallel consequently, from one opening 42a side of the coil part 42 concerned The tripod plate section 32 of another side of the aforementioned sheet metal-like magnetism board 30 on another side of two coil parts 42 and 42 in this bobbin 4 arranged in parallel moreover, from one opening 42a side of the coil part 42 concerned In the state where the decoration state was made to support the sheet metal-like magnetism board 30 concerned by the aforementioned back-up-plate section 41 by inserting to the position where the substrate section 31 of this sheet metal-like magnetism board 30 runs against one opening 42a edge of the coil part 42 Putting the tripod plate sections 32 and 32 of the couple of the sheet metal-like magnetism board 30 concerned can be kept inside the aforementioned coil part 42, respectively. Moreover, the sheet metal-like magnetism board 30 which precedes the tripod plate section 32 with the coil part 42 in a bobbin 4, and it kept putting to it in this way is received. Then, by carrying out the laminating of two or more sheet metal-like magnetism boards 30, as it keeps putting to the coil part 42 concerned as mentioned above from opening 42a opposite to opening 42a of the aforementioned coil part 42 into which the tripod plate section 32 of the sheet metal-like magnetism board 30 which precedes the sheet metal-like magnetism board 30 by which a

laminating is carried out was inserted Thus, the core object 3 which presents the appearance of the shape of an rectangular pipe of short \*\* which makes the above letter of the circumference with the sheet metal-like magnetism board 30 by which the laminating was carried out can be made to form. And the tripod plate section portions 33 and 33 of the couple in this core object 3 can make the state of having kept putting to the aforementioned coil part 42 there being nothing with backlash respectively. In addition, maintenance of the laminating state of this sheet metal-like magnetism board 30 can be made by using the so-called varnish etc. as the front face of this sheet metal-like magnetism board 30 by which the laminating was carried out with \*\*.

[0066] Moreover, this bobbin 4 is set to each of the two aforementioned coil parts 42 and 42. The position in the middle of [ length direction abbreviation ] the coil part 42 concerned is equipped with the batch flange 44 which revolves the coil part 42 concerned in the shape of the circumference, and it has carried out for the ability giving the coil M which was made to secure an insulating state by the batch flange 44 concerned, respectively, and became independent to the one side whose batch flange 44 of this was pinched, and the other side. Namely, if it is in the gestalt of this operation, while giving the coil M of an upstream to the one side whose aforementioned batch flange 44 was pinched in each of two coil parts 42 and 42 in the aforementioned bobbin 4 The secondary coil M can be given to the other side whose aforementioned batch flange 44 to which the coil Ma of the aforementioned upstream in the two coil parts 42 and 42 concerned is not given was pinched, and a coil can be constituted.

[0067] From having the back-up-plate section 41 to which the aforementioned bobbin 4 accompanies the whole surface side of the core object 3 constituted by carrying out the laminating of the sheet metal-like magnetism board 30, if it is in the gestalt of this operation for example, even when it constitutes the core object 3 by using as the sheet metal-like magnetism board 30 the iron nickel magnetism alloy board which sets thickness to 0.1mm or less it can be hard to produce the deformation of the sheet metal-like magnetism board 30 by which a laminating is carried out as possible, and it can be hard to produce change of the electrical property of the coil accompanying deformation of this core object 3, and degradation. Therefore, the laminating number of sheets of the sheet metal-like magnetism board 30 which can constitute this core object 3 as thinly as possible, and constitutes the core object 3 can be decreased convenient.

[0068] Moreover, since the coil M of an upstream and the secondary coil M are not wound around one coil part 42 in piles, the thickness size after the coil in the coil part 42 is also as small as possible, and it can do.

[0069] Therefore, according to the coil concerning the gestalt of this operation, the whole coil can be constituted as much as possible in a thin shape. More specifically, the thickness of the coil turned to the superficies side of broad Itabe 42c in the coil part 42 from the inferior-surface-of-tongue 41b side (the upper surface 41a side prepared in whole surface side 30a of the core object 3 by accompanying, opposite side) of the back-up-plate section 41 in the aforementioned bobbin 4 can be constituted so that it may become as thin as possible.

Consequently, the coil concerning the gestalt of this operation is suitable for using for the electronic equipment of a portable thin shape, and enables it to constitute this kind of electronic equipment in a thin shape more.

[0070] Moreover, according to the coil concerning the gestalt of this operation, since the coil M of an upstream and the secondary coil M are not made to wind in piles, Coil M can be given so that the number of turns and length of the coil M of an upstream and the secondary coil M may be made uniform, and a coil can be constituted so that a difference may not arise in the electrical property resulting from the direct current resistance of the coil M of an upstream, and the secondary coil M etc. Directivity is lost to installation of the coil to an electrical circuit in such a case, and the effort which pays exceptional consideration in installation of the coil to the circuit concerned can be mitigated.

[0071] Moreover, if it is in the gestalt of this operation, the aforementioned bobbin 4 joins the bobbin objects 45 and 45 of a couple, and is constituted.

[0072] If it is in the form of this operation, the bobbin objects 45 and 45 of this couple are constituted in this \*\* and isomorphism.

[0073] each bobbin object 45 -- each -- the above -- while having the back-up-plate section 41 which makes a long and slender tabular, it has the one aforementioned coil part 42 in the middle of the abbreviation for this back-up-plate section 41. Moreover, in both-sides section 45a which sandwiched the coil part 42 which makes the aforementioned flat tubed one, the aforementioned back-up-plate section 41 is constituted so that the board width may be made large.

[0074] And unilateral end-face 45b by the side of the thickness covering the length direction in one back-up-plate section 41 of the bobbin objects 45 and 45 of the couple constituted in this way. Where unilateral end-face 45b by the side of the thickness covering the length direction in the back-up-plate section 41 of another side of the bobbin objects 45 and 45 of this couple is compared, the bobbin objects 45 and 45 of a couple are joined and the aforementioned bobbin 4 is constituted.

[0075] Moreover, the bobbin objects 45 and 45 of this couple equip the one side which sandwiched the aforementioned coil part 42 in unilateral end-face 45b of the back-up-plate section 41 set to joint 45c which makes the aforementioned junction, respectively with 45d of salients into which the stoma 45e concerned fits stoma 45e again at the other side. From the position in the middle of [ length direction ] this bobbin object 45, the aforementioned stoma 45e and 45d of salients in one bobbin object 45 open an equal interval, and are prepared. And since the bobbin objects 45 and 45 of this couple are making this \*\* and isomorphism as mentioned above, if each joint 45c is opposed so that upper surface 21a of the aforementioned back-up-plate section 41 may become the same direction. Make 45d of salients of the bobbin object 45 of another side enter into stoma 45e of one bobbin object 45, and 45d of salients of one bobbin object 45 is made to enter into stoma 45e of the bobbin object 45 of another side, and the bobbin objects 45 and 45 of a couple are joined.

[0076] Both-sides section 45a which sandwiched the aforementioned coil part 42 in the aforementioned back-up-plate section 41 here if it was in the form of this operation. Upper surface 41of field 41 by the side of decoration of aforementioned core object 3 in 45a, i.e., the back-up-plate section concerned, a it constitutes by making the insulating secondary-forming layer 46 which becomes 45f of gradation sections which were able to be lowered to inside side 42e of the coil part 42 from plastic material in the junction state of the bobbin objects 45 and 45 of the aforementioned couple form to the height used as inside side 42e of the coil part 42, and this field.

[0077] That is, if it is in the form of this operation, after giving a coil to each of the bobbin objects 45 and 45 of the aforementioned couple at the coil part 42 of opposite Perilla frutescens (L.) Britton var. crispata (Thunb.) Decne., the bobbin objects 45 and 45 of this couple are joined as mentioned above first. The aforementioned secondary-forming layer 46 is made to form so that it may continue between the 45f of each aforementioned gradation section in the bobbin objects 45 and 45 of a couple subsequently joined in this way. ( Drawing 26 , drawing 27 ) It is made for the upper surface of the both-sides sections 45a and 45a which inserted this coil part 42 into each bobbin object 45 side to inside side 42e of the coil part 42 to turn into a decoration side of the aforementioned core object 3 of \*\*\*\*\* ( Drawing 28 , drawing 29 )

[0078] After Coil M is given to fabrication of this secondary-forming layer 46, it can be made by the forming technique, such as injection molding, by making the layer by plastic material form in the 45f of the aforementioned gradation sections to the aforementioned height at least by considering the joined bobbin objects 45 and 45 of a couple as an insertion. In addition, while making a forming layer form in the outside of the coil part 42 in fabrication of this secondary-forming layer 46 so that the coil M of each bobbin object 45 may be covered by this plastic material, the insulation between the aforementioned core object 3 and Coil M can be raised by filling up with the plastic material concerning the aforementioned crevice 43.

[0079] It shall be joined as mentioned above and the bobbin objects 45 and 45 of the couple which had the secondary-forming layer 46 formed in the outside of the coil part 42 shall be positioned on the same flat surface in upper surface 41a of the near field 41 where the core object 3 is decorated with the back-up-plate section 41 of one bobbin object 45, and the back-up-plate section 41 of the bobbin object 45 of another side, i.e., the back-up-plate section.

( Drawing 29 )

[0080] Consequently, by giving Coil M to the coil part 42 of each bobbin object 45, and fabricating the aforementioned junction and the secondary-forming layer 46 after this, before joining the bobbin objects 45 and 45 of a couple, if it is in the form of this operation. Making easy to perform the work which can be made to form the back-up-plate section 41 of a bobbin 4 as does not produce a level difference in upper surface 21a of the aforementioned back-up-plate section 41 of each bobbin object 45, and gives Coil M to the coil part 42. It can avoid producing trouble in support of the core object 3 by the back-up-plate section 41.

[0081] In addition, if it is in the form of this operation, it has the feature which can constitute this \*\* and the bobbin 4 equipped with two coil parts 42 and 42 by the aforementioned junction while constituting isomorphous for the bobbin objects 45 and 45 of a couple, and can constitute this bobbin 4 with one kind of bobbin object 45.

[0082] Moreover, while having formed 45g of \*\*\*\* in the edge (broad ltabe 42c which touches the double door mouths 42a and 42a of the coil part 42 which makes flat tubed [ in each bobbin object 45 ], and narrow ltabe 42d) It is constituted so that it may be low in this coil part 42 by the ejection size whose undersurface 41b of the back-up-plate section 41 is the 45g of the aforementioned \*\*\*\* and may become. Have formed level difference side 45i which continues in the 45h of the directions of inner of 45g of these \*\*\*\*, and between the 45h of the directions of inner of two aforementioned \*\*\*\* 45g and 45g, and the aforementioned level difference side 45i following this Coil M is stored in the bottom of undersurface 41b in both-sides section 45a of the back-up-plate section 41 which sandwiched the upper-limit side of 45g of \*\*\*\*, and the coil part 42, and it enables it to have given the coil M concerned.

[0083] Moreover, the terminal 47 which projects an end from the end face concerned to the method of outside in the state where it was made to embed in the back-up-plate section 41, respectively is formed in the near end face of the aforementioned joint 45c in both-sides section 45b of the back-up-plate section 41 which sandwiched the coil part 42 of each bobbin object 45, and the contrary. In the both-sides section which sandwiched the aforementioned coil part 42, this terminal 47 opens an interval and has prepared it two [ at a time ], respectively. Moreover, the guide rail 49 of the depth which stores the lead section Ma which is pulled out from the coil M given to the aforementioned coil part 42, and is entwined by the terminal 47 is formed in the undersurface of the aforementioned both-sides section 45a of each bobbin object 45.

Consequently, if it is in the form of this operation, the lead section Ma of the coil M given to the one side whose batch flange 44 formed in the coil part 42 in each bobbin object 45 was pinched is individually entwined for two terminals 47 and 47 in the one side of this. Moreover, the lead section Ma of the coil M given to the other side whose batch flange 44 concerned was pinched is individually entwined for two terminals 47 and 47 which are in a direction side in addition to this, and it constitutes so that it may have four coils with which the coil became independent.

[0084] Consequently, according to the form of this operation, the pattern made to form in the circuit board in which a coil is installed is minded. By connecting electrically the terminal 47 of the four aforementioned coils M and two coils M and M with arbitrary M--, and connecting electrically the terminal 47 of two coils M and M left behind apart from this Let two coils M and M of the complementary be the secondary coils M for four coils M and two arbitrary coils M and M of M-- as a coil M of an upstream.

[0085] Moreover, if it is in the form of this operation, it sets to each of the bobbin objects 45 and 45 of a couple. Along the edge of the aforementioned back-up-plate section 41 in an aforementioned joint 45c [ in both-sides section 45a which sandwiched the aforementioned coil part 42 ], and opposite side in the stage which the bobbin objects 45 and 45 of the couple concerned were joined as mentioned above, and constituted the bobbin 4. The insulating side plate section 48 of wrap height has formed end-face 30b (field which exists in the direction of a laminating of the core object 3 concerned) of the aforementioned core object 3 with which this back-up-plate section 41 is decorated. moreover, the upper surface and the upper surface of 45g of \*\*\*\* involving the aforementioned opening 42a of the aforementioned coil part 42 in this insulating side plate section 48 if it is in the form of this operation -- abbreviation -- it protrudes so that it may be located in the same height, and the end side is made to follow the

45g of the \*\*\*\* concerned at one

[0086] Consequently, if it is in the form of this operation, the bobbin 4 constituted with the bobbin objects 45 and 45 of a couple joined as mentioned above can be made to be equipped with the aforementioned insulating side plate section 48 which secures the insulation between the core objects 3 with which the terminal 47 and this bobbin 4 are equipped where the width-of-face size of the bobbin 4 concerned and a thickness size are made as small as possible.

[0087] The aforementioned bobbin object 45 consists of insulating material. Typically, this bobbin object 45 fabricates plastic material to one, and is constituted. Especially when it constitutes the bobbin object 45 using plastic material, it is desirable to constitute the bobbin object 45 from a viewpoint which makes the coil part 42 concerned agree as much as possible in an expected configuration as does not make the aforementioned coil part 42 which makes flat tubed produce distortion and deformation using a liquid crystal polymer or a diallyl phthalate.

[0088]

[Effect of the Invention] Since a core object is supported by the back-up-plate section in a bobbin, it is hard to make the sheet metal-like magnetism board which constitutes a core object produce deformation etc., and the thinner thing as this sheet metal-like magnetism board can be used, and reduction of the laminating number of sheets is not made to produce trouble further according to the coil concerning this invention, either.

[0089] Furthermore, if it is in a claim 2 and invention according to claim 3, since the coil of an upstream and a secondary coil are individually formed in the coil part which makes flat tubed, increase of the thickness of the coil by this coil can be made as small as possible.

[0090] That is, according to this invention, it has the feature which makes still easier thin shape-ization of the electronic equipment incorporated in a circuit so that thickness of the sense which intersects perpendicularly to the winding axis of the coil in a coil can be made as thin as possible and the thickness side of this coil may be made into a thickness side.

[Translation done.]

\* NOTICES \*

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] The plan of the bobbin object 24 concerning the gestalt of the first operation
- [Drawing 2] Rear view of this bobbin object 24
- [Drawing 3] The side elevation of this bobbin object 24
- [Drawing 4] The side elevation of the bobbin object 24 seen from the sense opposite to drawing 3
- [Drawing 5] The side elevation of the bobbin object 24 seen from different sense from drawing 3 and drawing 4
- [Drawing 6] The A-A line cross section in drawing 1
- [Drawing 7] The B-B line cross section in drawing 1
- [Drawing 8] The C-C line cross section in drawing 1
- [Drawing 9] The perspective diagram of the bobbin object 24 concerning the gestalt of the first operation
- [Drawing 10] The perspective diagram of this bobbin object 24
- [Drawing 11] The perspective diagram of a pair of same bobbin objects 24 and 24
- [Drawing 12] The perspective diagram separating and showing the bobbin 2 concerning the gestalt of the first operation, and two or more sheet metal-like magnetism boards 10 and 10 --
- [Drawing 13] The perspective diagram of the coil concerning the gestalt of the first operation
- [Drawing 14] The plan of this coil
- [Drawing 15] The bottom plan view of this coil
- [Drawing 16] The side elevation of this coil
- [Drawing 17] The D-D line cross section in drawing 14
- [Drawing 18] The E-E line cross section in drawing 14
- [Drawing 19] The block diagram showing the example of composition of the coil shown in drawing 1 or drawing 18 , and a different coil
- [Drawing 20] The block diagram showing the example of composition of the coil shown in drawing 1 or drawing 18 , and drawing 19 , and a different coil
- [Drawing 21] The side elevation of the bobbin object 45 concerning the gestalt of the second operation
- [Drawing 22] The side elevation of the bobbin object 45 seen from different sense from drawing 21
- [Drawing 23] The side elevation of the bobbin object 45 seen from different sense from drawing 21 and drawing 22
- [Drawing 24] The plan of the bobbin object 45 concerning the gestalt of the second operation
- [Drawing 25] The bottom plan view of this bobbin object 45
- [Drawing 26] The plan showing the combination state of a pair of same bobbin objects 45 and 45
- [Drawing 27] The side elevation showing the combination state of a pair of same bobbin objects 45 and 45
- [Drawing 28] The plan of the bobbin 4 which consists of bobbin objects 45 and 45 of a couple with which it was together put and the secondary-forming layer was formed
- [Drawing 29] The side elevation of the bobbin 4 which consists of bobbin objects 45 and 45 of a

- couple with which it was together put and the secondary-forming layer was formed
- [Drawing 30] The plan in which the sheet metal-like magnetism board 30 to the bobbin 4 concerning the gestalt of the second operation including, and showing process
- [Drawing 31] The side elevation of the coil concerning the gestalt of the second operation
- [Description of Notations]
- 1 Core Object
- 10 Sheet Metal-like Magnetism Board
- 11 Substrate Section
- 12 Tripod Plate Section
- 2 Bobbin
- 21 Back-Up-Plate Section
- 22 Coil Part
- 22b Covering section

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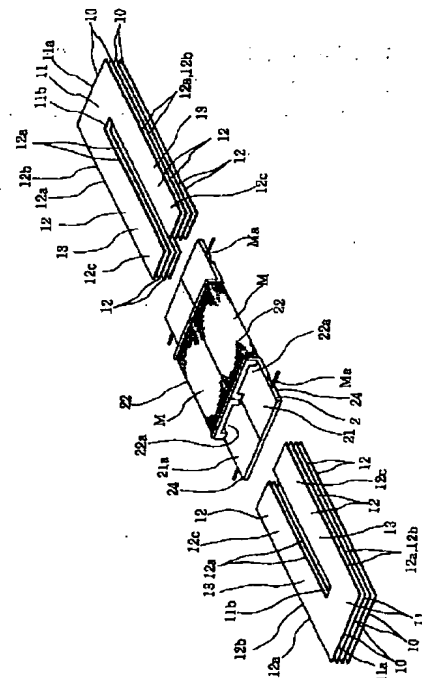
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(54) 【発明の名称】 コイル

(57) 【要約】

【課題】 コイルを支障なく薄型にする。

【解決手段】 基板部11の両端側から同じ向きに一对の脚板部12、12を一体に突き出すように延設させた薄板状磁性板10を積層して構成される磁心体1と、この磁心体1の一面側に添って設けられる補強板部21と、この補強板部21に一面側を添わせた前記磁心体1における前記一对の脚板部部分13、13の少なくとも一部をそれぞれ、当該補強板部21とにより偏平筒状の巻線部位22を構成して当該巻線部位22に収め入れるカバー部22bとを備え、かつ、絶縁性材料から構成されているボビン2とを有している。



## 【特許請求の範囲】

【請求項1】 基板部の両端側から同じ向きに一对の脚板部を一体に突き出すように延設させた薄板状磁性板を積層して構成される磁心体と、この磁心体の一面側に添って設けられる補強板部と、この補強板部に一面側を添わせた前記磁心体における一对の脚板部部分の少なくとも一部をそれぞれ、当該補強板部とにより偏平筒状の巻線部位を構成して当該巻線部位に収め入れるカバー部とを備え、かつ、絶縁性材料から構成されているボビンとを有して構成されていることを特徴とするコイル。

【請求項2】 ボビンの二か所の巻線部位のそれぞれに一次側の巻線が施されると共に、当該二か所の巻線部位における前記一次側の巻線が施されていない箇所にそれぞれ二次側の巻線が施されていることを特徴とする請求項1記載のコイル。

【請求項3】 ボビンの二か所の巻線部位の一方に一次側の巻線が、当該二か所の巻線部位の他方に二次側の巻線が施されていることを特徴とする請求項1記載のコイル。

【請求項4】 ボビンが、補強板部と巻線部位とを備えた一对のボビン体を接合して構成してあると共に、一方のボビン体の接合部と他方のボビン体の接合部とに、相互に嵌り合う凹部と突部とが設けてあり、この凹部に突部を収めた接合状態において一方のボビン体の補強板部と他方のボビン体の補強板部とが磁心体に添装される側の面を同一の平面上に位置付けるように構成してあることを特徴とする請求項1、請求項2又は請求項3記載のコイル。

【請求項5】 ボビンが、補強板部と巻線部位とを備えた一对のボビン体を接合して構成してあると共に、この一对のボビン体における補強板部がそれぞれ、巻線部位の外側に形成された当該巻線部位の内側面に対して低められた段落ち部に当該巻線部位の内側面と同面をなすように形成されたプラスチック材料よりなる絶縁性の二次成形層を備えており、当該二次成形層が、前記巻線部位に巻線を施した一对のボビン体を接合させた状態で、当該一对のボビン体の前記段落ち部間に互るように形成してあることを特徴とする請求項1、請求項2又は請求項3記載のコイル。

【請求項6】 一对のボビン体における接合部と反対側にある補強板部の端面から外方に突き出すように端子が設けてあると共に、当該補強板部における接合部と反対の側にある縁部に沿って添装される磁心体の端面を覆うように絶縁側板部が突設してあることを特徴とする請求項4又は請求項5記載のコイル。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】この発明は、板状磁性板を積層して構成される磁心体を有するコイルの改良に関する。

る。

## 【0002】

【従来の技術】各種の電子機器において、磁性板を積層して構成される磁心体を有するコイルが種々の用途に用いられているが、近年の電子機器の小型化、軽量化、薄型化の要請から、かかるコイルもできる限り薄型にすることが求められてきている。特に、携帯電話のバックライトのインバータトランス、モデムカードのライントランス、ノート型のパーソナルコンピュータ内蔵モデムのライントランスなど、携行が予定される電子機器に用いられるコイルにおいてこうした薄型化が強く求められている。

## 【0003】

【発明が解決しようとする課題】こうしたコイルをできる限り薄く構成するためには、前記磁心体の厚さ（この磁心体の外側にコイルボビンを介して施される巻線の巻回軸線に対し直交する向きの厚さ）寸法を小さくすることが一つの方策となり、これには、かかる磁心体を構成するように積層される各磁性板をできる限り薄くすることが有効と考えられる。

【0004】しかし、単純に前記磁心体を構成する各磁性板を薄くしてしまうと、かかる磁性板を薄くすればするほど当該磁心体のコイルボビンへの装着や、構成されたコイルの回路への組み込みなどにおいて加わる外力により当該磁性板が変形してしまい易くなる。そして、このような磁性板の変形が生じるとコイルの電気的特性を所期値に保つことができなくなる。

【0005】また、この種のコイルの前記巻線の巻回軸線が、電子機器の厚さ方向に直交する向き、すなわち、横向きになるように、当該コイルを当該電子機器の回路に組み込めるように当該コイルを構成することが、かかる電子機器の薄型化に資する一つの方策となるが、コイルの巻線部位を単一とし、この単一の巻線部位に一次側の巻線と二次側の巻線とを重ねて施す限り、この巻線によりかかる巻線部位は比較的厚くならざるを得ず、こうした手法ではコイルの十分な薄型化は図れないといえる。

【0006】そこでこの発明は、この種のコイルの磁心体を構成する磁性板を薄くしても、格別の支障を生じさせない構造を備えており、また、巻線によるコイルの厚さの増大をできる限り小さくでき、したがって、コイルにおける巻線の巻回軸線に対し直交する向きの厚さをできる限り薄くできるようにしたコイルの提供を目的とする。

## 【0007】

【課題を解決するための手段】前記目的を達成するために、請求項1記載の発明にあっては、コイルを、基板部の両端側から同じ向きに一对の脚板部を一体に突き出すように延設させた薄板状磁性板を積層して構成される磁心体と、この磁心体の一面側に添って設けられる補強板

部と、この補強板部に一面側を添わせた前記磁心体における一対の脚板部部分の少なくとも一部をそれぞれ、当該補強板部とにより偏平筒状の巻線部位を構成して当該巻線部位に収め入れるカバー部とを備え、かつ、絶縁性材料から構成されているボビンとを有している構成のものとした。

【0008】かかる構成によれば、前記ボビンの補強板部により、積層される薄板状磁性板の変形などができる限り生じ難いようにすることができ、かかる磁性体の変形に伴うコイルの電気的特性の変動、劣化を生じさせ難いようにすることができる。したがって、かかる磁性体をつくる限り薄く構成することができ、また、磁性体を構成する薄板状磁性板の積層枚数を支障なく減少させることができ、この結果、かかる薄板状磁性板の積層方向でのコイルの厚さ寸法をつくる限り限り小さくできる。

【0009】また、請求項2記載の発明にあつては、請求項1記載のコイルにおけるボビンの二か所の巻線部位のそれぞれに一次側の巻線が施されると共に、当該二か所の巻線部位における前記一次側の巻線が施されていない箇所にそれぞれ二次側の巻線が施されている構成とした。

【0010】かかる構成によれば、前記巻線部位が偏平筒状をなし、かつ、別個に、並列状態に設けられており、しかも、一つの巻線部位に一次側の巻線と二次側の巻線とが重ねて巻回されないことから、前記巻線部位の短寸方向、すなわち、前記薄板状磁性板の積層方向における巻線後の厚さ寸法をより一層小さくできる。

【0011】また、請求項3記載の発明にあつては、請求項1記載のコイルにおけるボビンの二か所の巻線部位の一方に一次側の巻線が、当該二か所の巻線部位の他方に二次側の巻線が施されている構成とした。

【0012】かかる構成によれば、一次側の巻線の巻線部位と二次側の巻線の巻線部位とが偏平筒状をなし、かつ、別個に、並列状態に設けられており、しかも、一つの巻線部位に一次側の巻線と二次側の巻線とが重ねて巻回されないことから、前記巻線部位の短寸方向、すなわち、前記薄板状磁性板の積層方向における巻線後の厚さ寸法をより一層小さくできる。

【0013】また、請求項4記載の発明にあつては、請求項1、請求項2又は請求項3記載のコイルを構成するボビンがさらに、補強板部と巻線部位とを備えた一対のボビン体を接合して構成してあると共に、一方のボビン体の接合部と他方のボビン体の接合部とに、相互に嵌り合う凹部と突部とが設けてあり、この凹部に突部を収めた接合状態において一方のボビン体の補強板部と他方のボビン体の補強板部とが磁心体に添装される側の面を同一の平面上に位置付けるように構成してあるものとした。

【0014】かかる構成によれば、一対のボビン体を接合する前に、それぞれのボビン体の巻線部位に巻線を施

し、この後、前記接合をなすことにより、それぞれのボビン体の前記補強板部における磁心体に添装される側の面に段差を生じないようにしてボビンの補強板部を形成させることができ、巻線部位へ巻線を施す作業を行い易くしながら、補強板部による磁心体の支持に支障を生じないようにすることができる。

【0015】また、請求項5記載の発明にあつては、請求項1、請求項2又は請求項3記載のコイルを構成するボビンがさらに、補強板部と巻線部位とを備えた一対のボビン体を接合して構成してあると共に、この一対のボビン体における補強板部がそれぞれ、巻線部位の外側に形成された当該巻線部位の内側面に対して低められた段落ち部に当該巻線部位の内側面と同面をなすように形成されたプラスチック材料よりなる絶縁性の二次成形層を備えており、当該二次成形層が、前記巻線部位に巻線を施した一対のボビン体を接合させた状態で、当該一対のボビン体の前記段落ち部間に互るように形成してあるものとした。

【0016】かかる構成によれば、一対のボビン体を接合する前に、それぞれのボビン体の巻線部位に巻線を施し、この後、前記接合をなし、かつ、一対のボビン体の段落ち部に前記二次成形層を備えさせることにより、それぞれのボビン体の前記補強板部における磁心体に添装される側の面に段差を生じないようにしてボビンの補強板部を形成させることができ、巻線部位へ巻線を施す作業を行い易くしながら、補強板部による磁心体の支持に支障を生じないようにすることができる。

【0017】また、請求項6記載の発明にあつては、請求項4又は請求項5記載のコイルがさらに、一対のボビン体における接合部と反対側にある補強板部の端面から外方に突き出すように端子が設けてあると共に、当該補強板部における接合部と反対の側にある縁部に沿って添装される磁心体の端面を覆うように絶縁側板部が突設してある構成を備えたものとした。

【0018】かかる構成によれば、前記のように接合される一対のボビン体により構成されるボビンに、その端子とこのボビンに装着される磁心体との間の絶縁性を確保する前記絶縁側板部を、当該ボビンの幅寸法、厚さ寸法をつくる限り小さくさせた状態で備えさせることができる。

【0019】

【発明の実施の形態】以下、この発明の典型的な実施の形態について説明する。

【0020】（第一の実施の形態）先ず、図1ないし図18に示される実施の形態について説明する。なお、ここで図1ないし図10は、コイルのボビン2を構成するボビン体24をそれぞれ示しており、図1は当該ボビン体24の一つを補強板部21の一面側から見て、また、図2は図1と反対の側から見て、また、図3は図1における左側から、また、図4は図1における右側から、ま

た、図5は図1における上側から、当該ボビン体24を見てそれぞれ示している。また、図6はボビン体24を長さ方向に沿って断面にして、また、図7および図8は当該ボビン体24を幅方向に沿って断面にして、それぞれ示している。また、図9および図10は、ボビン体24を斜視の状態それぞれ示している。

【0021】また、図11は、巻線部位22にそれぞれ巻線Mを施され、接合部24c側を向き合わせて接合される直前の一对のボビン体24、24を示しており、また、図12は、接合部24cをもって接合されボビン2を構成した一对のボビン体24、24と、このボビン2における巻線部位22に脚板部12を差し入れられる複数の薄板状磁性板10、10…とを斜視の状態示している。

【0022】また、図13ないし図18は、コイルをそれぞれ示しており、図13はかかるコイルを斜視の状態として、図14は補強板部21の一面側から見て、図15は図14と反対の側から見て、図16は図14における左側から見た状態で、また、図17および図18はコイルを幅方向に沿って断面にして、それぞれ示している。

【0023】この実施の形態にかかるコイルは、磁心体1とボビン2とを有する。

【0024】磁心体1は、基板部11の両端側においてそれぞれ、同じ向きに脚板部12を一体に突き出すように延設させた薄板状磁性板10を積層して構成されている。すなわち、この実施の形態にあつては、平面視においてコ字状をなし、かつ、前記基板部11と脚板部12とを同一の平面上に位置させるように、同面に配した薄板状磁性板10を、積層して前記磁心体1を構成している。各薄板状磁性板10は、いずれも略同寸、同形状に構成してある。また、一对の脚板部12、12の長さ寸法は、互いに等しくなるように構成してある。

【0025】かかる各薄板状磁性板10の積層は、一般に、積層される各薄板状磁性板10が、その脚板部12において、当該脚板部12の突き出し方向にある側縁12aを他の薄板状磁性板10の突き出し方向にある側縁12aに沿わせ、かつ、他の薄板状磁性板10の突き出し方向にある側縁12aから側方にズレ出さないようにしてなされる。このような積層は、例えば、各薄板状磁性板10の基板部11を同じ側に重ね合わせるようにしても、なすことができるが、この実施の形態にあつては、積層されて隣り合う一方の薄板状磁性板10の基板部11と他方の薄板状磁性板10の基板部11とが、反対に位置されるように、一方の薄板状磁性板10の基板部11が他方の薄板状磁性板10の脚板部12の突き出し端側に重ね合わされるようにして、前記積層をなしている。この結果、この実施の形態にあつては、前記磁心体1は、周回状をなす短寸の角筒状の外観を呈している。

【0026】一方、前記ボビン2は、第一に、前記磁心体1の一面側10aに添って設けられ、この一面側10aに添装される上面21aを平坦面とした補強板部21を有している。この補強板部21は、前記薄板状磁性板10の基板部11における脚板部12の延設側と反対の側縁11aから当該脚板部12の突き出し端12c縁までの長さ以上の長さで、当該薄板状磁性板10の一对の脚板部12、12の突き出し方向に沿った外側縁12b間の寸法以上の幅とを有している。

【0027】また、かかるボビン2は、第二に、並列状態に二か所の巻線部位22を有すると共に、この巻線部位22を両端開口22aの偏平筒状に構成している。そして、この二か所の巻線部位22の一方に、前記のように構成される磁心体1の一方の脚板部部分13を、また、かかる二か所の巻線部位22の他方にかかる磁心体1の他方の脚板部部分13を、それぞれ挿通状態に収める構成としてある。

【0028】より具体的には、かかるボビン2における前記偏平筒状をなす巻線部位22は、前記補強板部21における前記磁心体1の一面側10aに添装される上面21aに向き合い、かつ、この上面21aと略平行をなす内面を持つように形成された幅広板部22cおよび一对の幅狭板部22d、22dとからなるカバー部22bと、前記補強板部21との間で構成されている。補強板部21の上面21aとカバー部22bにおける幅広板部22cの内面との間の寸法は、前記磁心体1の厚さ寸法に略等しく、カバー部22bにおける一对の幅狭板部22d、22dの内面間の寸法は、かかる磁心体1の脚板部部分13の幅寸法に略等しくなるように構成してある。

【0029】また、かかる偏平筒状をなす巻線部位22における一方の開口22aから他方の開口22aまでの長さが、この巻線部位22の一方の開口22aから前記薄板状磁性板10の脚板部12を前記基板部11における脚板部12の突き出し側の側縁11bが当該一方の開口22a縁に突き当たる位置まで差し入れた状態において、他方の開口22a縁から前記脚板部12が前記基板部11の幅寸法分突き出されるような長さとなるように構成してある。

【0030】また、前記ボビン2における並列された二か所の巻線部位22、22間には、この二か所の巻線部位22、22に巻回された巻線M相互が接触し合わない幅の隙間23が形成されており、一方の巻線部位22側と他方の巻線部位22側とは、かかる巻線部位22を挟んだ両側にある補強板部21部分で連接された構成としてある。

【0031】この結果、この実施の形態においては、前記ボビン2における並列された二か所の巻線部位22、22の一方に前記薄板状磁性板10の一方の脚板部12を当該巻線部位22の一方の開口22a側から、また、

かかるボビン2における並列された二か所の巻線部位22、22の他方に前記薄板状磁性板10の他方の脚板部12を当該巻線部位22の一方の開口22a側から、この薄板状磁性板10の基板部11が巻線部位22の一方の開口22a縁に突き当たる位置まで差し入れることにより、前記補強板部21により添装状態に当該薄板状磁性板10を支持させた状態で、当該薄板状磁性板10の一对の脚板部12、12をそれぞれ前記巻線部位22の内側に差し通すことができる。また、このようにボビン2における巻線部位22に脚板部12を先行して差し通された薄板状磁性板10に対し、続いて積層される薄板状磁性板10を先行する薄板状磁性板10の脚板部12が差し入れられた前記巻線部位22の開口22aと反対の開口22aから前記のように当該巻線部位22に差し通すようにして複数の薄板状磁性板10を積層させることにより、このように積層された薄板状磁性板10により前記の周回状をなす短寸の角筒状の外観を呈する磁心体1を形成させることができ、しかも、この磁心体1における一对の脚板部部分13、13がそれぞれガタつきなく前記巻線部位22に差し通された状態を作り出すことができる。なお、かかる薄板状磁性板10の積層状態の維持は、例えば、いわゆるワニスなどを積層されたかかる薄板状磁性板10の表面に塗付することによりなすことができる。

【0032】そして、かかるボビン2における一对の巻線部位22、22の一方に一次側の巻線Mを施し、また、当該一对の巻線部位22、22の他方に二次側の巻線Mを施してコイルを構成するようにしてある。

【0033】この実施の形態にあっては、前記ボビン2が、薄板状磁性板10を積層して構成される磁心体1の一面側に添う補強板部21を有することから、例えば、厚さを0.1mm以下とする鉄ニッケル磁性合金板などを薄板状磁性板10として磁心体1を構成する場合でも、積層される薄板状磁性板10の変形などができる限り生じ難いようにすることができ、かかる磁心体1の変形に伴うコイルの電気的特性の変動、劣化を生じさせ難いようにすることができる。したがって、かかる磁心体1をできる限り薄く構成することができ、また、磁心体1を構成する薄板状磁性板10の積層枚数を支障なく減少させることができる。

【0034】また、一次側の巻線Mの巻線部位22と二次側の巻線Mの巻線部位22とが別個に、並列状態に設けられており、一つの巻線部位22に一次側の巻線Mと二次側の巻線Mとが重ねて巻回されないことから、巻線部位22における巻線後の厚さ寸法もできる限り小さくできる。

【0035】したがって、この実施の形態にかかるコイルによれば、コイル全体をできる限り薄型に構成することができる。より具体的には、前記ボビン2における補強板部21の下面21b側（磁心体1の一面側10aに

添って設けられる上面21aと反対の側）から巻線部位22における幅広部22cの外側側面に向けたコイルの厚さをできる限り薄くなるように構成できる。この結果、この実施の形態にかかるコイルは、携帯用の薄型の電子機器に用いるのに適しており、また、この種の電子機器をより薄型に構成できるようにするものである。

【0036】また、この実施の形態にかかるコイルによれば、一次側の巻線部位22と二次側の巻線部位22とが別個に、並列状態に設けられていることから、一次側の巻線Mと二次側の巻線Mの巻き数と長さを均一にするように巻線Mを施すことができ、一次側の巻線Mと二次側の巻線Mとの直流抵抗などに起因した電気的特性に差が生じないようにコイルを構成することができる。こうした場合、電気回路へのコイルの取り付けに方向性がなくなり、当該回路へのコイルの設置にあたって格別の配慮を払う労力を軽減することができる。

【0037】また、この実施の形態にあっては、前記ボビン2が、一对のボビン体24、24を接合して構成してある。

【0038】この実施の形態にあっては、かかる一对のボビン体24、24は、同寸、同形に構成してある。

【0039】それぞれのボビン体24は、いずれも前記細長い板状をなす補強板部21を有すると共に、この補強板部21の略中程に一つの前記巻線部位22を備えている。また、前記補強板部21が、前記偏平筒状をなす巻線部位22を挟んだ両側部24aにおいて、その板幅を広くするように構成してある。

【0040】そして、このように構成される一对のボビン体24、24の一方の補強板部21における長さ方向に互る厚さ側の一侧端面24bと、かかる一对のボビン体24、24の他方の補強板部21における長さ方向に互る厚さ側の一侧端面24bとを突き合わせた状態で、一对のボビン体24、24を接合して前記ボビン2を構成している。

【0041】また、かかる一对のボビン体24、24はそれぞれ、前記接合をなす接合部24cとなる補強板部21の一侧端面24bにおける、前記巻線部位22を挟んだ一方側に小孔24dを、また、他方側に当該小孔24dの嵌る突起24eを備えている。一つのボビン体24における前記小孔24dと突起24eは、かかるボビン体24の長さ方向中程の位置から等しい間隔を開けて設けてある。そして、かかる一对のボビン体24、24は前記のように同寸、同形をなしているため、前記補強板部21の上面21aが同じ向きになるようにそれぞれの接合部24cを向き合わせると、一方のボビン体24の小孔24dに他方のボビン体24の突起24eを入り込ませ、かつ、他方のボビン体24の小孔24dに一方のボビン体24の突起24eを入り込ませて、一对のボビン体24、24は接合し合わされる。

【0042】そして、この実施の形態にあっては、かか

る接合状態において一方のボビン体24の補強板部21と他方のボビン体24の補強板部21とが磁心体1に添装される側の面、すなわち補強板部21の上面を同一の平面上に位置付けるように構成してある。

【0043】この結果、この実施の形態にあつては、一对のボビン体24、24を接合する前に、それぞれのボビン体24の巻線部位22に巻線Mを施し、この後、前記接合をなすことにより、それぞれのボビン体24の前記補強板部21の上面21aに段差を生じないようにしてボビン2の補強板部21を形成させることができ、巻線部位22へ巻線Mを施す作業を行い易くしながら、補強板部21による磁心体1の支持に支障を生じないようにすることができる。

【0044】また、各ボビン体24の接合部24cにおいて前記補強板部21が幅広にされていることから、前記接合状態において並列される一方のボビン体24の巻線部位22と他方の巻線部位22との間には、施された巻線Mが接触し合わない程度の隙間23を確保することができる。

【0045】なお、この実施の形態にあつては、一对のボビン体24、24を同寸、同形に構成しながら、前記接合により二か所の巻線部位22を備えたボビン2を構成できる種類のボビン体24によりかかるボビン2を構成できる特長を有する。

【0046】また、各ボビン体24における偏平筒状をなす巻線部位22の両開口22a、22aに接する幅広板部22cと幅狭板部22dの端部に、外鍔24fが形成してあると共に、この巻線部位22において補強板部21の下面21bが前記外鍔24fの突き出し寸法相当分低くなるように構成され、かかる外鍔24fの内方面24gに連続する段差面24hが形成してあり、二か所の前記外鍔24f、24fの内方面24gとこれに続く前記段差面24hとの間に、外鍔24fの上端面および巻線部位22を挟んだ補強板部21の両側部24aにおける下面21b下に巻線Mを収めて当該巻線Mを施すことができるようにしてある。

【0047】また、各ボビン体24の巻線部位22を挟んだ補強板部21の両側部24aにおける前記接合部24cと反対の側端部にはそれぞれ、一端を補強板部21に埋め込ませて端子25が設けてあると共に、この巻線部位22に施された巻線Mから引き出され端子25にからめられるリード部Maを収める深さの案内溝26が形成してある。

【0048】前記ボビン体24は、絶縁性材料から構成される。典型的には、かかるボビン体24は、プラスチック材料を一体に成形して構成される。プラスチック材料を用いてボビン体24を構成する場合には、特に、偏平筒状をなす前記巻線部位22に至や、変形を生じささないようにして当該巻線部位22を所期の形状にできる限り合致させる観点から、液晶ポリマー、あるいは、ジ

アリルフタレートを用いてボビン体24を構成することが好ましい。

【0049】なお、以上に説明した実施の形態にかかるコイルのボビン2の二か所の巻線部位22、22のそれぞれに一次側の巻線M（すなわち、巻線Ma）を施すと共に、当該二か所の巻線部位22、22における前記一次側の巻線Maが施されていない箇所にそれぞれ二次側の巻線M（すなわち、巻線Mb）を施してコイルを構成することもある。（図19、図20）

【0050】この場合には、二か所の前記巻線部位22、22のそれぞれにおいて、隣り合って巻回される一次側の巻線Maと二次側の巻線Mbとが電氣的に接触しないように、当該巻線部位22に鋸状の仕切鍔部27を設けておくことが好ましい。

【0051】かかる場合には、例えば、図19に示されるように、二か所の巻線部位22、22の一方に施された一次側の巻線Maの隣に二か所の巻線部位22、22の他方に施された一次側の巻線Maが位置するようにし、かつ、二か所の巻線部位22、22の一方に施された二次側の巻線Mbの隣に二か所の巻線部位22、22の他方に施された二次側の巻線Mbが位置するようにする。あるいはまた、図20に示されるように、二か所の巻線部位22、22の一方に施された一次側の巻線Maの隣に二か所の巻線部位22、22の他方に施された二次側の巻線Mbが位置するようにし、かつ、二か所の巻線部位22、22の一方に施された二次側の巻線Mbの隣に二か所の巻線部位22、22の他方に施された一次側の巻線Maが位置するようにする。

【0052】このようにコイルを構成した場合には、例えば、二か所の巻線部位22、22の一方に巻き付けた一次側の巻線Maの巻き終りを接続した端子と、二か所の巻線部位22、22の他方に巻き付けた一次側の巻線Maの巻き始めを接続した端子とを、また、二か所の巻線部位22、22の一方に巻き付けた二次側の巻線Mbの巻き終りを接続した端子と、二か所の巻線部位22、22の他方に巻き付けた二次側の巻線Mbの巻き始めを接続した端子とを、それぞれコイルの設置される回路基板に形成させたパターンを介して電氣的に接続して、コイルとして機能させるようにすることができる。

【0053】（第二の実施の形態）次いで、図21ないし図31に示される実施の形態について説明する。

【0054】なお、ここで図21ないし図25は、コイルのボビン4を構成するボビン体45をそれぞれ示しており、図21は当該ボビン体45の端子47の突設側から見て、また、図22は図21と反対の側から見て、また、図23は図21における右側から、また、図24は図21における上側から、また、図25は図21における下側から、当該ボビン体45を見てそれぞれ示している。

【0055】また、図26および図27は、巻線部位4

2にそれぞれ巻線Mを施され接合部45c側を向き合わせて接合された一対のボビン体45、45をそれぞれ示しており、また、図28および図29は、接合部45cをもって接合され、かつ、巻線部位42の両側部45aにおける段落ち部45fに二次成形層46を形成されて、ボビン4とされた一対のボビン体45、45をそれぞれ示している。

【0056】また、図30は、図28および図29のボビン4に対し、巻線部位42に磁心体3を構成する複数の薄板状磁性板30、30…を順次に差し入れて磁心体3を構成する過程を示しており、さらに、図31は、複数の薄板状磁性板30、30…を積層状態に備えて磁心体3の脚板部部分33の一部を巻線部位42内に収めた状態のコイルを側方から見て示している。

【0057】この実施の形態にかかるコイルは、磁心体3とボビン4とを有する。

【0058】磁心体3は、基板部31の両端側においてそれぞれ、同じ向きに脚板部32を一体に突き出すように延設させた薄板状磁性板30を積層して構成されている。すなわち、この実施の形態にあつては、平面視においてコ字状をなし、かつ、前記基板部31と脚板部32とを同一の平面上に位置させるように、同面に配した薄板状磁性板30を、積層して前記磁心体3を構成している。各薄板状磁性板30、30…は、いずれも略同寸、同形状に構成してある。また、一対の脚板部32、32の長さ寸法は、互いに等しくなるように構成してある。

【0059】かかる各薄板状磁性板30の積層は、一般に、積層される各薄板状磁性板30、30…が、その脚板部32において、当該脚板部32の突き出し方向にある側縁32aを他の薄板状磁性板30の突き出し方向にある側縁32aに沿わせ、かつ、他の薄板状磁性板30の突き出し方向にある側縁32aから側方にズレ出さないようにしてなされる。このような積層は、例えば、各薄板状磁性板30、30…の基板部31を同じ側に重ね合わせるようにしてもなすことができるが、この実施の形態にあつては、積層されて隣り合う一方の薄板状磁性板30の基板部31と他方の薄板状磁性板30の基板部31とが、反対に位置されるように、一方の薄板状磁性板30の基板部31が他方の薄板状磁性板30の脚板部32の突き出し端32c側に重ね合わされるようにして、前記積層をなしている。この結果、この実施の形態にあつては、前記磁心体3は、周回状をなす短寸の角筒状の外観を呈している。

【0060】一方、前記ボビン4は、第一に、前記磁心体3の一面側30aに添って設けられ、この一面側30aに添装される上面41aを平坦面とした補強板部41を有している。この補強板部41は、前記薄板状磁性板30の基板部31における脚板部32の延設側と反対の側縁31aから当該脚板部32の突き出し端32c縁までの長さ以上の長さ、当該薄板状磁性板30の一対の

脚板部32、32の突き出し方向に沿った外側縁32b間の寸法以上の幅とを有している。

【0061】また、かかるボビン4は、第二に、並列状態に二か所の巻線部位42、42を有すると共に、この巻線部位42を両端開口42aの偏平筒状に構成している。そして、この二か所の巻線部位42、42の一方に、前記のように構成される磁心体3の一方の脚板部部分33を、また、かかる二か所の巻線部位42、42の他方にかかる磁心体3の他方の脚板部部分33を、それぞれ挿通状態に収める構成としてある。

【0062】より具体的には、かかるボビン4における前記偏平筒状をなす巻線部位42は、前記補強板部41における前記磁心体3の一面側30aに添装される上面41aに向き合い、かつ、この上面41aと略平行をなす内面を持つように形成された幅広板部42cおよび一対の幅狭板部42d、42dとからなるカバー部42bと、前記補強板部41との間で構成されている。補強板部41の上面41aとカバー部42bにおける幅広板部42cの内面との間の寸法は、前記磁心体3の厚さ寸法に略等しく、カバー部42bにおける一対の幅狭板部42d、42dの内面間の寸法は、かかる磁心体3の脚板部部分32の幅寸法に略等しくなるように構成してある。

【0063】また、かかる偏平筒状をなす巻線部位42は、この巻線部位42における一方の開口42aから他方の開口42aまでの長さ、この巻線部位42の一方の開口42aから前記薄板状磁性板30の脚板部32を前記基板部31における脚板部32の突き出し側の側縁31bが当該一方の開口42a縁に突き当たる位置まで差し入れた状態において、他方の開口42a縁から前記脚板部32が前記基板部31の幅寸法分突き出されるような長さとなるように構成してある。

【0064】また、前記ボビン4における並列された二か所の巻線部位42、42間には、この二か所の巻線部位42、42に巻回された巻線M相互が接触し合わない幅の隙間43が形成されており、一方の巻線部位42側と他方の巻線部位42側とは、かかる巻線部位42を挟んだ両側にある補強板部41部分で連接された構成としてある。

【0065】この結果、この実施の形態においては、前記ボビン4における並列された二か所の巻線部位42、42の一方に前記薄板状磁性板30の一方の脚板部32を当該巻線部位42の一方の開口42a側から、また、かかるボビン4における並列された二か所の巻線部位42、42の他方に前記薄板状磁性板30の他方の脚板部32を当該巻線部位42の一方の開口42a側から、この薄板状磁性板30の基板部31が巻線部位42の一方の開口42a縁に突き当たる位置まで差し入れることにより、前記補強板部41により添装状態に当該薄板状磁性板30を支持させた状態で、当該薄板状磁性板30の

一对の脚板部32、32をそれぞれ前記巻線部位42の内側に差し通すことができる。また、このようにボビン4における巻線部位42に脚板部32を先行して差し通された薄板状磁性板30に対し、続いて積層される薄板状磁性板30を先行する薄板状磁性板30の脚板部32が差し入れられた前記巻線部位42の開口42aと反対の開口42aから前記のように当該巻線部位42に差し通すようにして複数の薄板状磁性板30を積層させることにより、このように積層された薄板状磁性板30により前記の周回状をなす短寸の角筒状の外観を呈する磁心体3を形成させることができ、しかも、この磁心体3における一对の脚板部部分33、33がそれぞれガタつきなく前記巻線部位42に差し通された状態を作り出すことができる。なお、かかる薄板状磁性板30の積層状態の維持は、例えば、いわゆるワニスなどを積層されたかかる薄板状磁性板30の表面に塗付することによりなすことができる。

【0066】また、かかるボビン4は、前記二か所の巻線部位42、42のそれぞれにおいて、当該巻線部位42の長さ方向略中程の位置に当該巻線部位42を周回状に巡る仕切鋸部44を備えており、この仕切鋸部44を挟んだ一方側と他方側とにそれぞれ、当該仕切鋸部44により絶縁状態を確保させて独立した巻線Mを施すことができるようにしてある。すなわち、この実施の形態にあつては、前記ボビン4における二か所の巻線部位42、42のそれぞれにおいて、前記仕切鋸部44を挟んだ一方側に一次側の巻線Mを施すと共に、当該二か所の巻線部位42、42における前記一次側の巻線Maが施されていない前記仕切鋸部44を挟んだ他方側に二次側の巻線Mを施してコイルを構成することができる。

【0067】この実施の形態にあつては、前記ボビン4が、薄板状磁性板30を積層して構成される磁心体3の一面側に添う補強板部41を有することから、例えば、厚さを0.1mm以下とする鉄ニッケル磁性合金板などを薄板状磁性板30として磁心体3を構成する場合でも、積層される薄板状磁性板30の変形などができる限り生じ難いようにすることができ、かかる磁心体3の変形に伴うコイルの電気的特性の変動、劣化を生じさせ難いようにすることができる。したがって、かかる磁心体3をできる限り薄く構成することができ、また、磁心体3を構成する薄板状磁性板30の積層枚数を支障なく減少させることができる。

【0068】また、一つの巻線部位42に一次側の巻線Mと二次側の巻線Mとが重ねて巻回されないことから、巻線部位42における巻線後の厚さ寸法もできる限り小さくできる。

【0069】したがって、この実施の形態にかかるコイルによれば、コイル全体をできる限り薄型に構成することができる。より具体的には、前記ボビン4における補強板部41の下面41b側（磁心体3の一面側30aに

添って設けられる上面41aと反対の側）から巻線部位42における幅広板部42cの外表面側に向けたコイルの厚さをできる限り薄くなるように構成できる。この結果、この実施の形態にかかるコイルは、携帯用の薄型の電子機器に用いるのに適しており、また、この種の電子機器をより薄型に構成できるようにするものである。

【0070】また、この実施の形態にかかるコイルによれば、一次側の巻線Mと二次側の巻線Mとを重ねて巻回させないことから、一次側の巻線Mと二次側の巻線Mの巻き数と長さとを均一にするように巻線Mを施すことができ、一次側の巻線Mと二次側の巻線Mとの直流抵抗などに起因した電気的特性に差が生じないようにコイルを構成することができる。こうした場合、電気回路へのコイルの取り付けに方向性がなくなり、当該回路へのコイルの設置にあたって格別の配慮を払う労力を軽減することができる。

【0071】また、この実施の形態にあつては、前記ボビン4が、一对のボビン体45、45を接合して構成してある。

【0072】この実施の形態にあつては、かかる一对のボビン体45、45は、同寸、同形に構成してある。

【0073】それぞれのボビン体45は、いずれも、前記細長い板状をなす補強板部41を有すると共に、この補強板部41の略中程に一つの前記巻線部位42を備えている。また、前記補強板部41が、前記偏平筒状をなす巻線部位42を挟んだ両側部45aにおいて、その板幅を広くするように構成してある。

【0074】そして、このように構成される一对のボビン体45、45の一方の補強板部41における長さ方向に互る厚さ側の一側端面45bと、かかる一对のボビン体45、45の他方の補強板部41における長さ方向に互る厚さ側の一側端面45bとを突き合わせた状態で、一对のボビン体45、45を接合して前記ボビン4を構成している。

【0075】また、かかる一对のボビン体45、45はそれぞれ、前記接合をなす接合部45cとなる補強板部41の一側端面45bにおける、前記巻線部位42を挟んだ一方側に小孔45eを、また、他方側に当該小孔45eの嵌る突起45dを備えている。一つのボビン体45における前記小孔45eと突起45dは、かかるボビン体45の長さ方向中程の位置から等しい間隔を開けて設けてある。そして、かかる一对のボビン体45、45は前記のように同寸、同形をなしているため、前記補強板部41の上面21aが同じ向きになるようにそれぞれの接合部45cを向き合わせると、一方のボビン体45の小孔45eに他方のボビン体45の突起45dを入り込ませ、かつ、他方のボビン体45の小孔45eに一方のボビン体45の突起45dを入り込ませて、一对のボビン体45、45は接合し合わされる。

【0076】ここで、この実施の形態にあつては、前記

補強板部41における前記巻線部位42を挟んだ両側部45a、45aにおける前記磁心体3の添装側の面、すなわち、当該補強板部41の上面41aが、巻線部位42の内側面42eに対して低められた段落ち部45fに前記一対のボビン体45、45の接合状態においてプラスチック材料よりなる絶縁性の二次成形層46を巻線部位42の内側面42eと同面となる高さまで形成させることにより構成してある。

【0077】すなわち、この実施の形態にあっては、先ず、前記一対のボビン体45、45のそれぞれに対しその巻線部位42に巻線を施した後、この一対のボビン体45、45を前記のように接合させる。(図26、図27) 次いで、このように接合された一対のボビン体45、45におけるそれぞれの前記段落ち部45f間に互るように前記二次成形層46を形成させて、それぞれのボビン体45の側において巻線部位42の内側面42eに対しこの巻線部位42を挟んだ両側部45a、45aの上面が略同面の前記磁心体3の添装面となるようにしている。(図28、図29)

【0078】かかる二次成形層46の成形は、巻線Mを施された後互いに接合された一対のボビン体45、45をインサートとして、射出成形などの成形手法により、少なくとも前記段落ち部45fに前記高さまでプラスチック材料による層を形成させることによりなすことができる。なお、この二次成形層46の成形にあたり、かかるプラスチック材料によってそれぞれのボビン体45の巻線Mを覆うように巻線部位42の外側に成形層を形成させると共に、前記隙間43にかかるプラスチック材料が充填されるようにすることにより、前記磁心体3と巻線Mとの間の絶縁性を高めることができる。

【0079】上記のように接合され、巻線部位42の外側に二次成形層46を形成された一対のボビン体45、45は、一方のボビン体45の補強板部41と他方のボビン体45の補強板部41とが磁心体3に添装される側の面、すなわち補強板部41の上面41aを同一の平面上に位置付けるものとされる。(図29)

【0080】この結果、この実施の形態にあっては、一対のボビン体45、45を接合する前に、それぞれのボビン体45の巻線部位42に巻線Mを施し、この後、前記接合と二次成形層46の成形とをなすことにより、それぞれのボビン体45の前記補強板部41の上面21aに段差を生じないようにしてボビン4の補強板部41を形成させることができ、巻線部位42へ巻線Mを施す作業を行い易くしながら、補強板部41による磁心体3の支持に支障を生じないようにすることができる。

【0081】なお、この実施の形態にあっては、一対のボビン体45、45を同寸、同形に構成しながら、前記接合により二か所の巻線部位42、42を備えたボビン4を構成でき、一種類のボビン体45によりかかるボビン4を構成できる特長を有する。

【0082】また、各ボビン体45における偏平筒状をなす巻線部位42の両開口42a、42aに接する幅広板部42cと幅狭板部42dとの端部に、外罫45gが形成してあると共に、この巻線部位42において補強板部41の下面41bが前記外罫45gの突き出し寸法相当分低くなるように構成され、かかる外罫45gの内方面45hに連続する段差面45iが形成してあり、二か所の前記外罫45g、45gの内方面45hとこれに続く前記段差面45iとの間に、外罫45gの上端面および巻線部位42を挟んだ補強板部41の両側部45aにおける下面41b下に巻線Mを収めて当該巻線Mを施すことができるようにしてある。

【0083】また、各ボビン体45の巻線部位42を挟んだ補強板部41の両側部45bにおける前記接合部45cと反対の側の端面にはそれぞれ、一端を補強板部41に埋め込めた状態で当該端面から外方に突き出す端子47が設けてある。この端子47は、前記巻線部位42を挟んだ両側部においてそれぞれ、間隔を開けて二本ずつ設けてある。また、各ボビン体45の前記両側部45aの下面には、前記巻線部位42に施された巻線Mから引き出され端子47にからめられるリード部Maを収める深さの案内溝49が形成してある。この結果、この実施の形態にあっては、各ボビン体45における巻線部位42に形成された仕切罫部44を挟んだ一方側に施された巻線Mのリード部Maをこの一方側にある二本の端子47、47に個別にからめ、また、当該仕切罫部44を挟んだ他方側に施された巻線Mのリード部Maをこの他方側にある二本の端子47、47に個別にからめて、コイルが独立した四か所の巻線を備えるように構成してある。

【0084】この結果、この実施の形態によれば、コイルの設置される回路基板に形成させたパターンを介して、前記四か所の巻線M、Mの任意の二つの巻線M、Mの端子47を電気的に接続し、これとは別に残された二つの巻線M、Mの端子47を電気的に接続することにより、四つの巻線M、Mのうちの任意の二つの巻線M、Mを一次側の巻線Mとして、また、その余の二つの巻線M、Mを二次側の巻線Mとすることができる。

【0085】また、この実施の形態にあっては、一対のボビン体45、45のそれぞれにおいて、前記巻線部位42を挟んだ両側部45aにおける前記接合部45cと反対の側にある前記補強板部41の縁部に沿って、当該一対のボビン体45、45が前記のように接合されてボビン4を構成した段階で、この補強板部41に添装される前記磁心体3の端面30b(当該磁心体3の積層方向にある面)を覆う高さの絶縁側板部48が形成してある。また、この実施の形態にあっては、かかる絶縁性側板部48は、前記巻線部位42の前記開口42aを巡る外罫45gの上面とその上面を略同じ高さ位置されるように突設されており、かつ、当該外罫45gに一端側

を一体に連続させている。

【0086】この結果、この実施の形態にあつては、前記のように接合される一対のボビン体45、45により構成されるボビン4に、その端子47とこのボビン4に装着される磁心体3との間の絶縁性を確保する前記絶縁性側板部48を、当該ボビン4の幅寸法、厚さ寸法をできる限り小さくさせた状態で備えさせることができる。

【0087】前記ボビン体45は、絶縁性材料から構成される。典型的には、かかるボビン体45は、プラスチック材料を一体に成形して構成される。プラスチック材料を用いてボビン体45を構成する場合には、特に、偏平筒状をなす前記巻線部位42に歪や、変形を生じさせないようにして当該巻線部位42を所期の形状にできる限り合致させる観点から、液晶ポリマー、あるいは、ジアリルフタレートを用いてボビン体45を構成することが好ましい。

【0088】

【発明の効果】この発明にかかるコイルによれば、ボビンにおける補強板部により磁心体を支持することから、磁心体を構成する薄板状磁性板に変形などを生じさせ難いものとされ、かかる薄板状磁性板としてより薄いものを用いることができ、さらに、その積層枚数の減少にも、支障を生じさせない。

【0089】また、さらに、請求項2および請求項3記載の発明にあつては、一次側の巻線と二次側の巻線とが、偏平筒状をなす巻線部位に個別に形成されることから、かかる巻線によるコイルの厚さの増大をできる限り小さくできる。

【0090】すなわち、この発明によれば、コイルにおける巻線の巻回軸線に対し直交する向きの厚さをできる限り薄くすることができ、このコイルの厚さ側を厚さ側とするように回路内に組み込む電子機器の薄型化を一層容易とする特長を有する。

【図面の簡単な説明】

【図1】第一の実施の形態にかかるボビン体24の平面図

【図2】同ボビン体24の背面図

【図3】同ボビン体24の側面図

【図4】図3と反対の向きから見たボビン体24の側面図

【図5】図3および図4と異なる向きから見たボビン体24の側面図

【図6】図1におけるA-A線断面図

【図7】図1におけるB-B線断面図

【図8】図1におけるC-C線断面図

【図9】第一の実施の形態にかかるボビン体24の斜視図

【図10】同ボビン体24の斜視図

【図11】同一対のボビン体24、24の斜視図

【図12】第一の実施の形態にかかるボビン2と複数の薄板状磁性板10、10…とを分離して示す斜視図

【図13】第一の実施の形態にかかるコイルの斜視図

【図14】同コイルの平面図

【図15】同コイルの底面図

【図16】同コイルの側面図

【図17】図14におけるD-D線断面図

【図18】図14におけるE-E線断面図

【図19】図1ないし図18に示されるコイルと異なるコイルの構成例を示す構成図

【図20】図1ないし図18および図19に示されるコイルと異なるコイルの構成例を示す構成図

【図21】第二の実施の形態にかかるボビン体45の側面図

【図22】図21と異なる向きから見たボビン体45の側面図

【図23】図21および図22と異なる向きから見たボビン体45の側面図

【図24】第二の実施の形態にかかるボビン体45の平面図

【図25】同ボビン体45の底面図

【図26】同一対のボビン体45、45の組み合わせ状態を示す平面図

【図27】同一対のボビン体45、45の組み合わせ状態を示す側面図

【図28】組み合わせられ、かつ、二次成形層の形成された一対のボビン体45、45よりなるボビン4の平面図

【図29】組み合わせられ、かつ、二次成形層の形成された一対のボビン体45、45よりなるボビン4の側面図

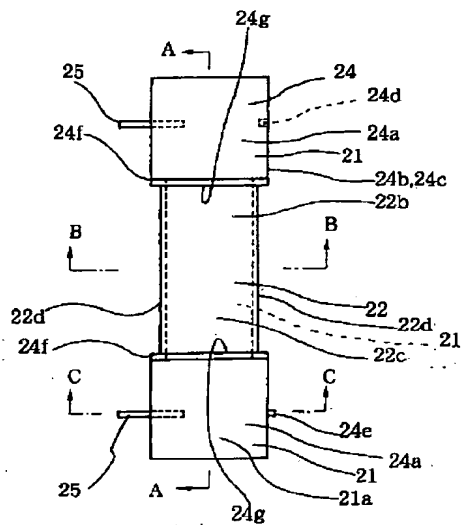
【図30】第二の実施の形態にかかるボビン4への薄板状磁性板30の組み入れ過程を示す平面図

【図31】第二の実施の形態にかかるコイルの側面図

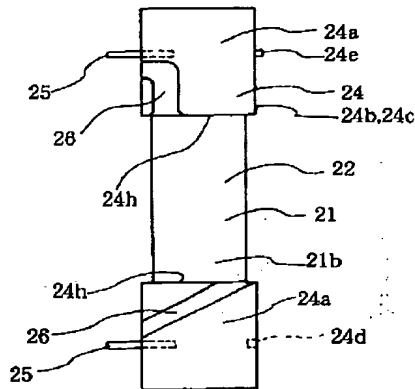
【符号の説明】

- 1 磁心体
- 10 薄板状磁性板
- 11 基板部
- 12 脚板部
- 2 ボビン
- 21 補強板部
- 22 巻線部位
- 22b カバー部

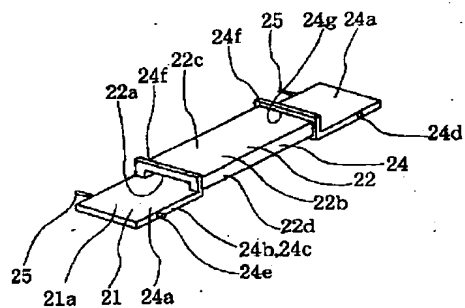
【図1】



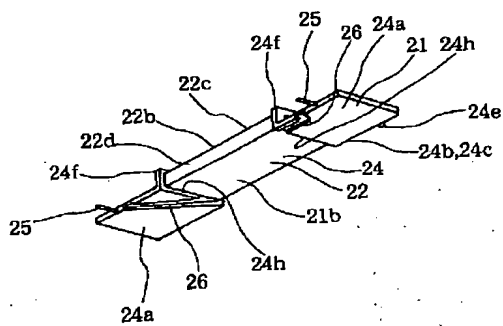
【図2】



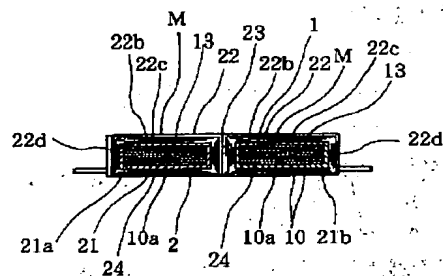
【図9】



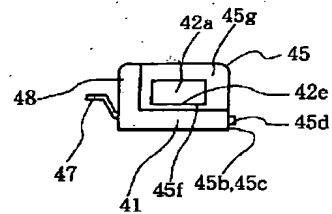
【図10】



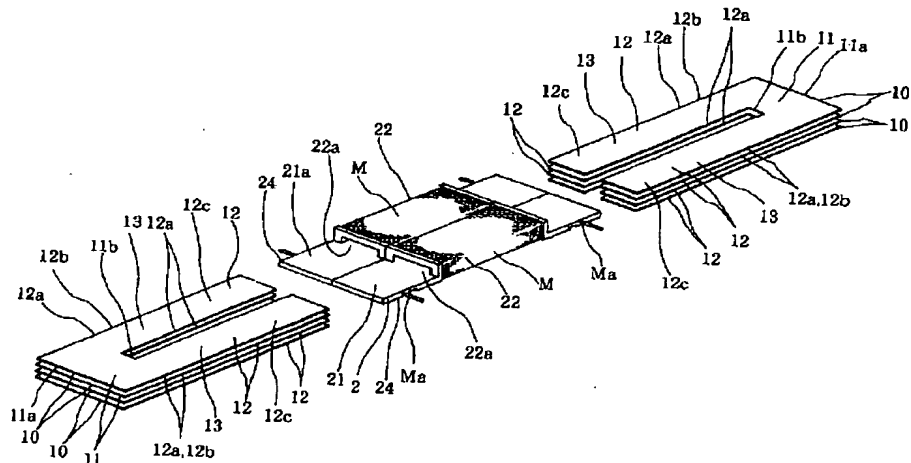
【図17】



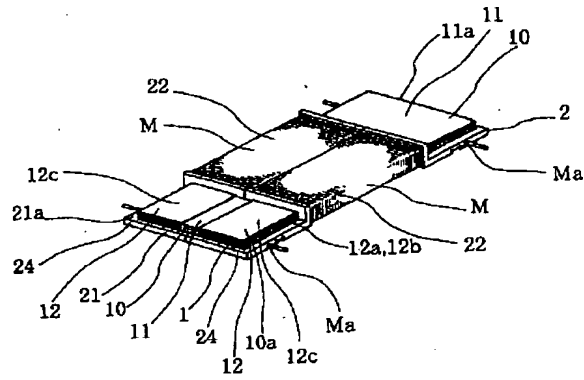
【図23】



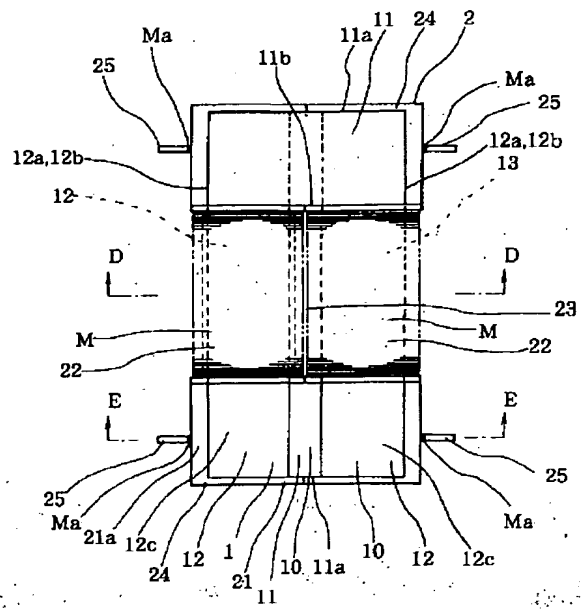
【図12】



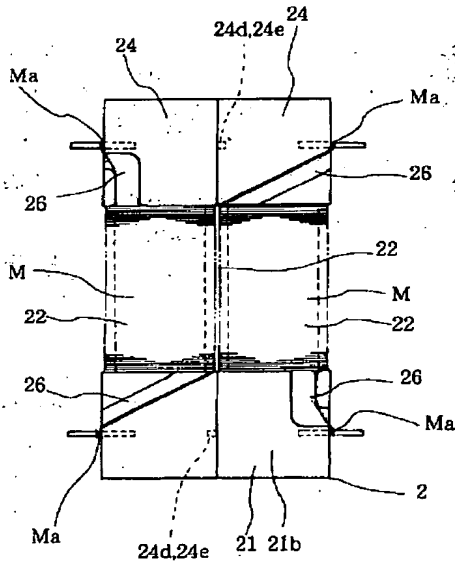
【図13】



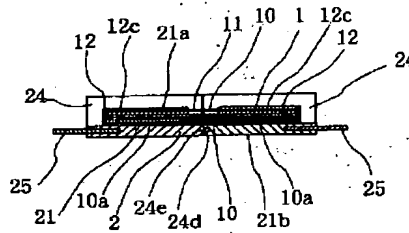
【図14】



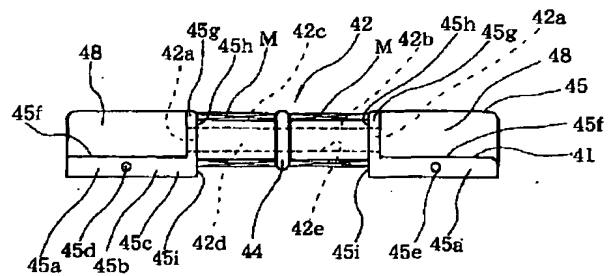
【図15】



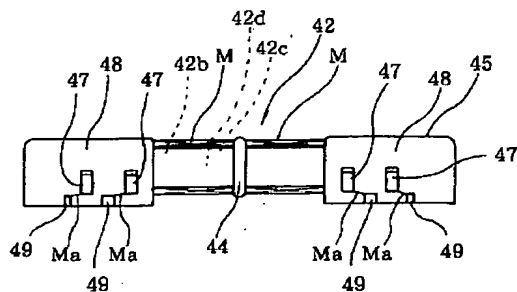
【図18】



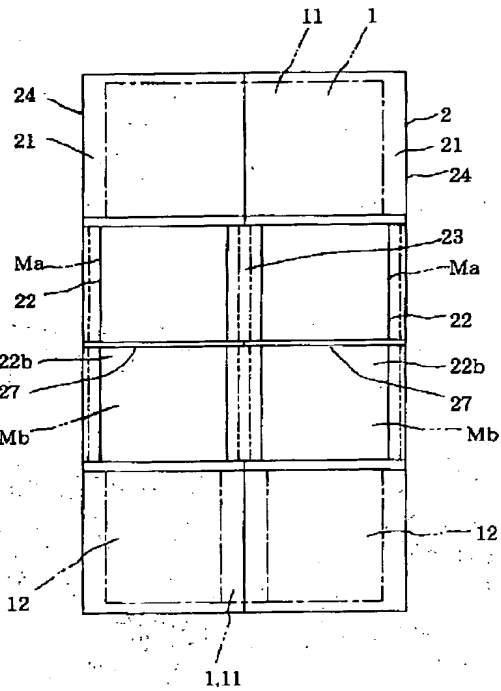
【図22】



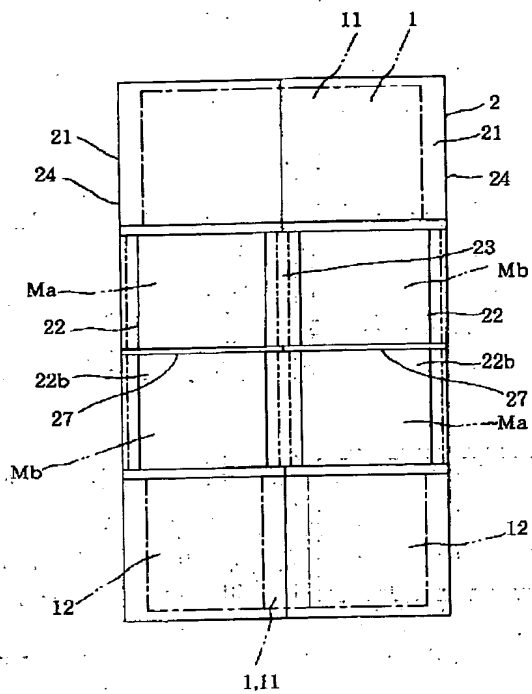
【図21】



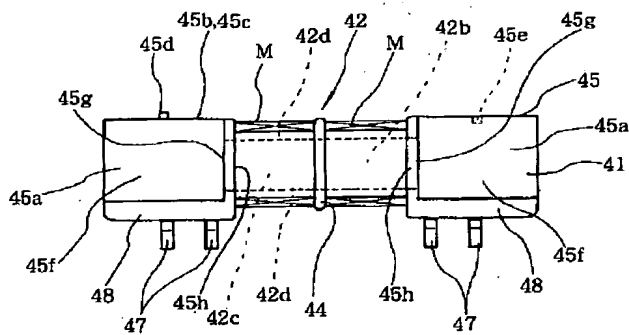
【図19】



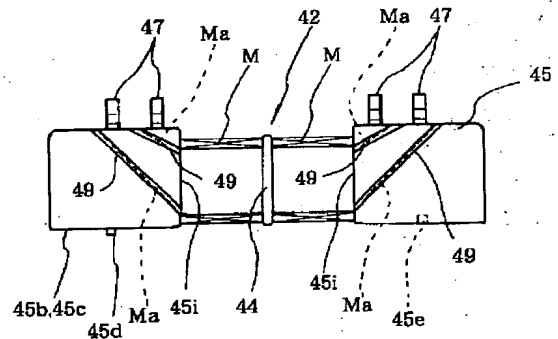
【図20】



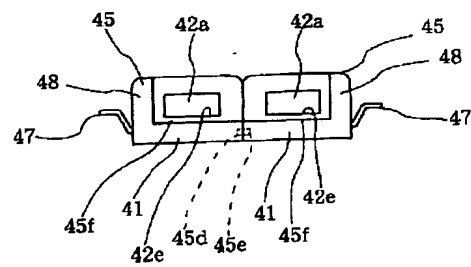
【図24】



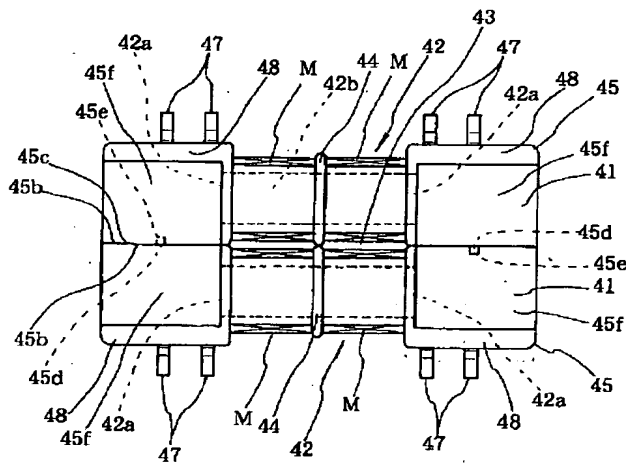
【图25】



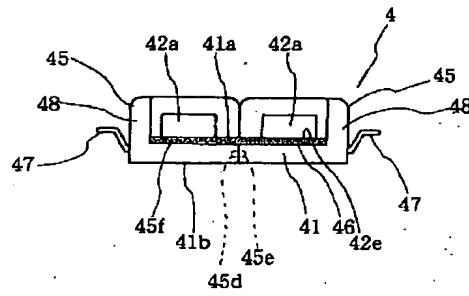
【图27】



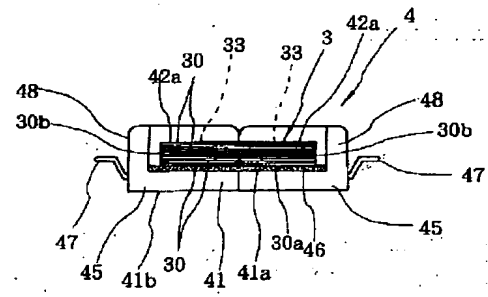
【図26】



【図29】



【図31】



【図28】

